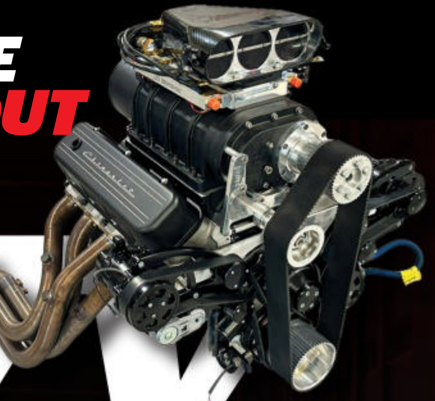
565CI VS. 632 BLOWN BIG-BLOCK ENGINE DYNO SHOOTOUT



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496CI BIG-BLOCK 1971 CHEVELLE

COMFY CRUISING

1957 CHEVY WAGON A/C INSTALL, PART 2

ENGINE COOLING OPTIONS

CHOOSING THE RIGHT RADIATOR

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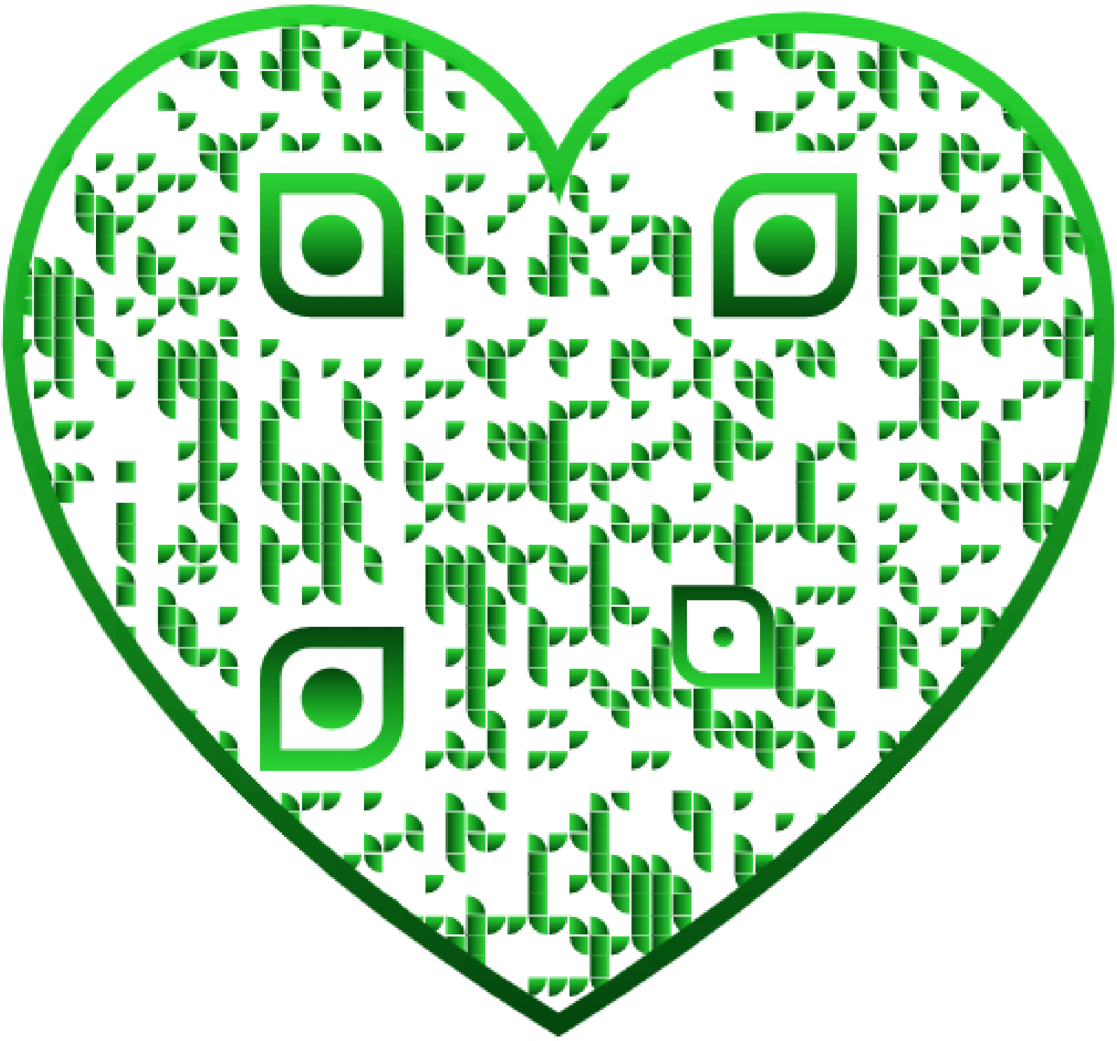
HOW-TO: MAINTAIN MAXIMUM HEADLIGHT VOLTAGE



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TRUSS

MARK 9 DOUBLE SLOT

THREE SPOKE TEARDROP

TRACK GT

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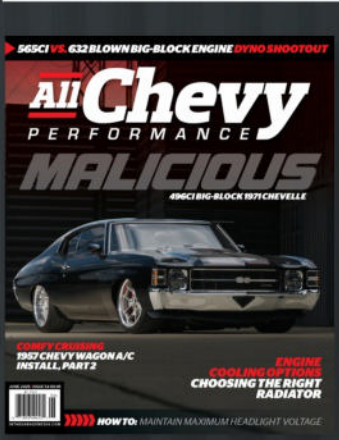
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HOW TO: MAINTAIN MAXIMUM HEADLIGHT VOLTAGE

ON THE COVER

Ryan Gebhardt's relationship with this 1971 Chevelle goes back nearly 40 years, and today with its low stance and brilliant black paint, it looks right at home on the cover of our June '25 issue. Check out the full feature starting on page 16.

Image by NotStock Photography

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Rod Shop

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2021 RECIPIENT OF THE HRIA BUSINESS OF THE YEAR AWARD

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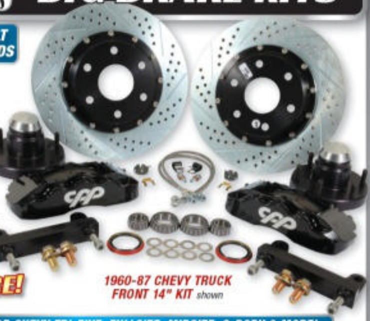
BUILT FOR THE STREET!

6 PISTON CPP PRO Series 13" & 14" PERFORMANCE BIG BRAKE KITS

FRONT: MOST POPULAR APPLICATIONS | **REAR: GM 10/12 BOLT & FORD 9" REAR ENDS**



FEATURES:
- 13" or 14" 2-Piece Pre-Assembled Drilled/Slotted & Zinc-Coated Rotors
- 6-piston Billet Aluminum Stationary Calipers w/DOT Compliant Dust & Weather Seals
- Corvette C5/C6 Caliper Brake Pads
- NAS Premium Stainless Hardware
- Braided Stainless Steel Brake Hoses
- Front Kits Compatible with CPP's Modular™ Corvette-Style, & OE Stock Spindles

MORE BRAKE PISTON, MORE PERFORMANCE!

1960-87 CHEVY TRUCK FRONT 14" KIT shown

CORVETTE-STYLE SPINDLES ONLY starting at $319/pr

PERFORMANCE HUB & BEARING ASSEMBLY starting at $155/ea

FOR CHEVY TRI-FIVE, FULLSIZE, MIDSIZE, G-BODY & MORE!

ALSO AVAILABLE FOR CHEVY C10 TRUCKS

FRONT OR REAR KITS!

MADE IN THE USA

PRO-SERIES 6-PISTON BRAKE KITS
13" OR 14" / FRONT OR REAR starting at $2430/kit

UPRIGHT SPINDLES — AVAILABLE FOR MOST POPULAR CHEVY APPLICATIONS — CORVETTE-STYLE SPINDLE WHEEL BRAKE KITS

13" ROTORS DRILLED & SLOTTED

FEATURES:
- Corvette-Style Spindles Cast from High Quality Ductile Iron
- 13" Front Cross-Drilled & Gas-Slotted Zinc Rotors
  REQUIRES 17" DIAMETER WHEELS
- Large Dual-Piston Loaded Black or Red Calipers
- Modern Corvette-Style Sealed Bearing C7 Performance Hub with 7/16x20 Studs and 1/2x20 Pre-Drilled Assemblies
- Brake Lines & Installation Hardware
- Works with Stock or CPP Totally Tubular™ Control Arms

ZERO OFFSET

DIRECT BOLT-ON!

2" DROP OR STOCK-HEIGHT SPINDLES

1968-74 NOVA, 1967-69 CAMARO, 1964-72 MIDSIZE AFX BODY DROP SPINDLE KIT WITH C7 HUBS shown

BLACK CALIPERS ALSO AVAILABLE

BRAKE KITS WITH UPGRADED C7 PERFORMANCE HUBS starting at $979/kit

CORVETTE-STYLE SPINDLE OPTIONS!

STOCK
DROP
2ND GEN!

CAMARO, NOVA, CHEVELLE 2" DROP OR STOCK

2ND GEN. CAMARO STOCK HEIGHT

SPINDLES ONLY starting at $319/pr

TRI-FIVE 2" DROP

G-BODY STOCK HEIGHT

CPP PREMIUM STEERING COLUMNS

UNIVERSAL FLOOR SHIFT & CHEVY TRI-FIVE COLUMN SHIFT shown

NEW 100% RE-DESIGN!

ADJUSTABLE 5-WAY TILT

SATIN BLACK OR CHROME

PRO BUILDER'S CHOICE

FLOOR OR COLUMN SHIFT

- New - Tighter Tilt Mechanism
- New - Shift Handle & Shift Collar— Eliminating All Excess Play with More Positive Shift Points
- New - Improved Turn Signal & Neutral Safety Switch
- New - Professional Finish— Satin Black or Chrome
- New - Damage Free Plastic Shipping Suite Case

28", 30" 32" & 33"

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UNIVERSAL FIT starting at $429/ea

Classic Fit™ PREMIUM 1955-56-57 TRI-FIVE COLUMNS starting at $449/ea

Classic Fit™ PREMIUM READY TO INSTALL 1967-72 TRUCK COLUMNS starting at $549/ea

POWER STEERING CONVERSION KITS

500 Series

MOST POPULAR CAR & TRUCK APPLICATIONS!

DIRECT BOLT-IN

14:1 SPORT RATIO!

- Power Steering Gear Box
- Power Steering Pump
- Inverted Flare Hose Kit w/Pressure & Return Line
- Mounting Brackets & Hardware

CONVERSION KITS* starting at $720/kit

POWER STEERING GEAR BOXES ONLY starting at $449/ea

WE OFFER A HUGE ASSORTMENT OF POWER STEERING COMPONENTS & ACCESSORIES

SOS COMPLETE 13" FRONT & 12" REAR BIG BRAKE KITS

Requires 17" disc brake type wheels — shown with optional upgrades

DUAL 52MM PHENOLIC PISTON FRONT CALIPERS

WE CARRY THE RIGHT SIZE & FIT BRAKES FOR EVERY BUILD!

COMPLETE FRONT & REAR BIG BRAKE KIT starting at $1798/kit

COMPLETE KIT FEATURES FRONT & REAR KIT COMPONENTS

WORKS WITH 2" DROP SPINDLE OR ORIGINAL DRUM SPINDLES, AVAILABLE SEPARATELY

COMPLETE KIT INCLUDES 4-WHEEL MASTER CYLINDER & PROP VALVE KIT!

OFFERS ABOUT 60% MORE STOPPING POWER!

FOR ALL POPULAR CAR & TRUCK APPLICATIONS

13" FRONT BRAKE KIT FEATURES:
- 13" Front Cross-Drilled, Gas-Slotted & Zinc-Washed Rotors
- Front Dual 52mm Loaded Calipers
- Forged Aluminum Hubs with Screw-in Studs
- Front Bearings & Seals
- All Mounting Brackets, Hoses, Brake Lines & Hardware

FRONT KIT starting at $960/kit

12" REAR BRAKE KIT FEATURES:
- 12" Rear Cross-Drilled, Gas-Slotted & Zinc-Washed Rotors
- Rear Single 45mm Loaded Calipers
- Rear E-Brake Cables
- Brackets, Hoses & Brake Lines
- All Mounting Hardware

REAR KIT starting at $795/kit

FUEL-INJECTION TANKS & SYSTEMS

Classic-Fit EFI ALL-IN-ONE

FOR MOST POPULAR CAR & TRUCK APPLICATIONS!

Classic-Fit HYBRID ALUMINUM TANKS — MIDNITE SERIES BLACK FINISH!

1964-67 EL CAMINO KIT shown

COMPLETE ALL-IN-ONE EFI FUEL TANK SYSTEM

- Stamped Steel Fuel-Injection Ready Tank
- Complete EFI Fuel Line Kit —Including -6AN Fittings
- Fuel Regulator/Filter Combo
- Fuel Tank Sending Unit
- 255 L/H In-Tank Pump up to 600HP — (High-Volume 340 L/H Also Available)
- OE Direct-Fit Installation — Requires No Modifications
- Mounting Straps, Brackets & Hardware

STAMPED STEEL

15.5 GAL. CAPACITY

IN-TANK PUMP INCLUDED!

OE Style — CLASSIC FIT COMPLETE ALL-IN-ONE EFI READY TANK SYSTEM starting at $625/kit

1963-72 CHEVY C10 BED-FILL 20 GAL. shown

RAW ALUMINUM ALSO AVAILABLE!

NEW HYBRID DESIGN!

CARBURETED/ EFI FUEL TANKS

- Thickest, strongest & largest capacity
- Tig Welded 5051 Aluminum
- For Internal or External Pumps
- Fuel Trap with Extra Fuel Port for Both Carbureted or Fuel Injection Installs
- Direct Bolt-In Fit Between Frame Rails
- Mounting Straps, Brackets & Hardware

HEAVY DUTY

BED-FILL
STANDARD
BED-FILL
FLUSH

ALUMINUM TANKS (RAW FINISH) starting at $599/kit

MIDNITE SERIES TANKS (BLACK FINISH) starting at $649/kit ASK FOR DETAILS!

WE CARRY FUEL TANK COMPONENTS FOR ALL POPULAR APPLICATIONS!

PRO-TOURING PERFORMANCE! SUBFRAME CONNECTORS

MADE IN THE USA — PTK+ PRO-TOURING SERIES UPGRADE

- Round Tubing Resists Torsional Twist
- Maximum Ground Clearance & Resistance to Chassis Flex
- Increased Integrity & Rigidity of the Chassis
- Mounting Hardware
- Available in Black Powdercoated Finish

starting at $229/kit

FOR CHEVY NOVA & CAMARO APPLICATIONS

PRO-TOURING PERFORMANCE! FULLY ADJUSTABLE TRACTION BARS

DIRECT BOLT-ON

MADE IN THE USA — PTK+ PRO-TOURING SERIES UPGRADE

- Compatible with Mono-Leaf & Multi-Leaf Applications
- For Use in Lowered or Stock Rear Axle
- Front Mount Offers More Clearance
- Self-Lubricating D-Type Bushings
- Mounting Hardware

starting at $369/kit

STREET TRAC

FOR CHEVY FULLSIZE, NOVA & CAMARO APPLICATIONS

*Prices subject to change without notice, please inquire. Also, please note that kits and prices may vary between certain applications.

PROVEN ON THE TRACK!

TRUE ORIGINAL OFFSET WHEEL BRAKE KITS

1955-68 CHEVY FULLSIZE

GET THE BEST STOPPING POWER FOR YOUR CLASSIC CHEVY FULLSIZE CAR!

shown with optional upgrades

1955-58, 0 OFFSET
1959-64, +5/8" OFFSET
1965-68, +1/4" OFFSET

FEATURES:

- Forged Aluminum Billet Hub w/Slip-On Rotors
- GM's Large 2-15/16" Bore Calipers
- Installation Hardware
- Keeps Your Wheels in the Same Location As the Drums

MANY UPGRADES AVAILABLE!

starting at **$599**/kit

2" DROP SPINDLES! 12" FRONT DISC BRAKE KITS

LARGEST BRAKES AVAILABLE FOR 15" OR LARGER WHEELS!

UPDATE YOUR FRONT DISC OR DRUM BRAKES!

FEATURES:

- Big 12" Front 1-Pc. Rotors
- Large GM Loaded Calipers
- 2" Drop Spindle Kit w/Built-in Steering Arms & Integrated Caliper Brackets
- Front Bearings, Seals, Dust Caps & Spindle Nuts
- Rubber Brake Hose Kit
- Installation Hardware

1958-64 CHEVY FULLSIZE KIT
shown with optional upgrades

UPGRADES AVAILABLE!

FOR MOST POPULAR APPLICATIONS

12" BRAKE KIT WITH DROP SPINDLES starting at **$505**/kit

APPLICATION SPECIFIC SPINDLES ALSO AVAILABLE SEPARATELY starting at **$229**/pr

HydraSTOP HYDRAULIC ASSIST SYSTEMS

STREET BEAST™
UP TO 1800 PSI AT THE WHEELS!
DIRECT BOLT-IN!

COMPLETE SYSTEM INCLUDES RUBBER BRAKE ASSIST HOSE KITS!

100% BRAND NEW! NOT RE-BUILT

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- Ideal for Engines Producing Low Vacuum or Large Cam Applications
- Aluminum Master Cylinder w/Prop & Stop Block Kit (Upgrade Options Available - Including Wilwood)
- Billet Aluminum Mounting Bracket
- Pressure & Return Hose Kits
- Pedal Rod Hardware
- Mounting Hardware

FOR MOST POPULAR APPLICATIONS

NO VACUUM? NO PROBLEM!

STREET BEAST™ SYSTEM starting at **$979**/kit

HYDRAULIC ASSIST BARE UNIT ONLY starting at **$579**/kit

ASK ABOUT OUR SHOW STOPPER SYSTEM!

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7"/8"/9" or 11" DIA.

SINGLE OR DUAL BOOSTERS
MASTER CYLINDER COMBOS

- Aluminum Corvette-Style Master Cylinder w/Cover & Bails in Black Finish
- Vacuum Assisted 7"/8"/9"/11" Diameter Single & Dual Brake Boosters in Black Finish
- Mounting Brackets & Hardware

APPLICATION SPECIFIC & UNIVERSAL KITS

FIREWALL OR FRAME MOUNT APPLICATIONS starting at **$389**/kit

ELECTRONIC THROTTLE PEDAL & BRACKET KIT

NEW!

The proper way to mount your gas pedal when converting your vehicle to late model "Drive By Wire" LS engine conversion. Gives you a platform to neatly mount the included GM throttle pedal.

YEAR & MODEL SPECIFIC APPLICATIONS

LOOKS LIKE THE GM ORIGINAL!

starting at **$149**/kit

COIL-OVER CONVERSION & TUBULAR CONTROL ARMS SUSPENSION SYSTEMS

D-SPEC PERFORMANCE BUSHINGS

PTK+ PRO-TOURING SERIES COMPONENTS

DIRECT BOLT-ON SYSTEMS- WELDED FOR MAXIMUM STRENGTH & VISUAL IMPACT!

FOR CHEVY FULLSIZE, NOVA, CAMARO & CHEVELLE

SYSTEMS ALSO AVAILABLE FOR CHEVY C10 TRUCKS*

UPPER & LOWER CONTROL ARM SET

Totally TUBULAR

- Exclusive Progressive Bump Stops
- Ball Joints Already Installed
- Black Powdercoated Finish

WITH FRONT COIL-OVER CONVERSION KIT

DUAL ADJUSTABLE

- Dual-Adjustable Shocks Allow Custom Tuning Compression & Rebound Valving Allow Adjustable Ride Height
- Specially Designed Conical Springs
- Spanner Wrench & Thrust Bearing Kit
- All Mounting Hardware

Independent with 19 Positions of Adjustment for Each Dial!

MADE IN THE USA

Both Kits Include Spanner Wrench & Bearing Kit While Supplies Last!

COMPLETE SYSTEMS-TOTALLY TUBULAR™ UPPER & LOWER CONTROL ARMS W/ FRONT COIL-OVER KIT starting at **$1520**/kit

ALSO AVAILABLE SEPARATELY!

TOTALLY TUBULAR CONTROL ARMS ONLY

UPPER & LOWER TUBULAR CONTROL ARM SET ONLY starting at **$975**/set

DUAL-ADJUSTABLE COIL-OVER CONVERSION KITS ONLY

FOR POPULAR APPLICATIONS FRONT KIT starting at **$549**/kit
FOR A-BODY & C10 TRUCKS REAR KIT starting at **$699**/kit

PTK4 PRO-TOURING PACKAGE SUPERIOR BRAKING PERFORMANCE & COMPLETE PRO-TOURING SUSPENSION PACKAGES

13" ROTORS

WITH MASTER CYLINDER PROP VALVE COMBO

1968-72 CHEVELLE/ EL CAMINO KIT shown
UPGRADE COMPONENTS ALSO AVAILABLE!

FEATURES:

- Complete 13" Front CPP Big Brake Kit
- Complete 12" Rear CPP Big Brake Kit
- Chrome Master Cylinder & Adjustable Prop Valve Distribution Block Combo
- Pro-Touring Front & Rear Sway Bars
- Totally Tubular™ Upper & Lower Control Arms
- Dual-Adjustable Front Coil-Over Conversion Kit
- Complete Rear Suspension System*

MADE IN THE USA

FOR MOST POPULAR APPLICATIONS

PTK-4 PACKAGE starting at **$4320**/kit

HIGH-CLEARANCE/PRO-TOURING SWAY BAR KITS

1967-69 CAMARO / 1968-74 NOVA FRONT shown
FOR CHEVY TRUCK, TRI-FIVE, NOVA, CAMARO, & A-BODY APPLICATIONS
IDEAL FOR LARGER WHEELS!
1.25" LIGHTWEIGHT! BARS
1964-72 A-BODY REAR shown
NEW!

FRONT

- Precision Laser Cut 3/8" Leg Fits Tight to the Chassis Allowing for Larger Front Tires
- Heim-Joint End-Links
- Mounting Brackets & Hardware

REAR

- Precision Laser Cut 3/8" Leg Allows for More Clearance Around the Shock Mounts
- Adjustable Heim-Joint End-Links
- Mounting Brackets & Hardware
- Rear Kits Work with Factory Style or Performance Rear Ends

MADE IN THE USA

PTK+ PRO-TOURING SERIES UPGRADE

BLACK POWDERCOATED FINISH

ADJUSTABLE HEIM-JOINT END-LINKS! | **NEW DESIGN! LIGHTWEIGHT BARS** | **BILLET MOUNTS & POLYPLUS™ BUSHINGS!**

FRONT HIGH-CLEARANCE SWAY BAR KIT starting at **$249**/kit
REAR HIGH-CLEARANCE SWAY BAR KIT starting at **$319**/kit

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Vintage Air GEN 5

Terry Kervin's '85 Camaro
By Greening Auto Company
Robert McGaffin Photo

Vintage Air SureFit™ Systems

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49 YEARS

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- GEN5 systems are a "clean sheet", All-the-tools-in-the box deal.
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- Increased mounting hard-points for easer installation.
- Tighter sealing "over-molded' air doors for greater temperature control.
- Latest technology, OEM "block type" expansion valve.
- All GEN 5 systems use our proven Gen IV controls for easy upgrades.
- Many applications feature our new "MAX" blower motor/fan package.
- Like every product, we never sell'em 'til we run them long and hard.

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RISE ABOVE
SKY-HIGH GASSER-STYLE '55

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Video of the Week
Watch video
Read full article

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"FITMENT AND QUALITY WERE AT THE TOP OF MY LIST. GOLDEN STAR HAD THE BEST OF BOTH." - BRADLEY W - TENNESSEE

TRI-FIVE CHEVY QUARTER PANELS

QP13-55LOE	55 Hardtop No Holes - Drivers
QP13-55ROE	55 Hardtop No Holes - Pass
QP13-551LOE	55 Conv No Holes - Drivers
QP13-551ROE	55 Conv No Holes - Pass
QP13-552LOE	55 Sedan w/Window - Drivers
QP13-552ROE	55 Sedan w/Window - Pass
QP13-56LOE	56 Hardtop No Holes - Drivers
QP13-56ROE	56 Hardtop No Holes - Pass
QP13-561LOE	56 Conv No Holes - Drivers
QP13-561ROE	56 Conv No Holes - Pass
QP13-562LOE	56 Sedan w/Window - Dr*
QP13-562ROE	56 Sedan w/Window - Ps*
QP13-57LOE	57 Hardtop w/Holes - Drivers
QP13-57ROE	57 Hardtop w/Holes - Pass
QP13-571LOE	57 Conv w/Holes - Drivers
QP13-571ROE	57 Conv w/Holes - Pass
QP13-572LOE	57 Sedan w/Window - Driver
QP13-572ROE	57 Sedan w/Window - Pass

* COMING SOON!

TRI-FIVE CHEVY BUMPERS

BU13-55F	1955 Front 7-pc w/Brackets
BU13-55R	1955 Rear 3-pc
BU13-551R	1955 Belair Rear Smoothie 1-pc
BU13-562F	1956 Front Smoothie 1-pc
BU13-56R	1956 Rear 3-pc w/Brackets
BU13-563R	1956 Rear Smoothie
BU13-57F	1957 Front 5-pc
BU13-57RS	1957 Rear 3-pc

TRI-FIVE CHEVY FENDERS

FE13-55L	1955 Chevy - Drivers
FE13-55R	1955 Chevy - Pass
FE13-56L	1956 Chevy - Drivers
FE13-56R	1956 Chevy - Pass
FE13-57L	1957 150 w/o Holes - Drivers
FE13-57R	1957 150 w/o Holes - Pass
FE13-571L	1957 210 & BelAir w/Holes - Dr
FE13-571R	1957 210 & BelAir w/Holes - Ps

TRI-FIVE CHEVY TAILLIGHTS

TP13-55L	1955 Outer Lenses (pr)
TP13-55B	1955 Bezels (pr)
TP13-55H	1955 Housing Dr & Ps
BU13-57T	1957 Assembly (pr)

TRI-FIVE CHEVY DOORS

DO13-55L	55-57 2-Dr Sedan - Drivers
DO13-55R	55-57 2-Dr Sedan -Pass
DO13-551L	55 & 57 2-Dr Hardtop - Drivers
DO13-551R	55 & 57 2-Dr Hardtop - Pass
DO13-56L	56 2-Dr Hardtop* - Drivers
DO13-56R	56 2-Dr Hardtop* - Pass
DO13-552L	55-57 2-Dr Convertible - Drivers
DO13-552R	55-57 2-Dr Convertible - Pass
DO13-555L	55-57 Nomad - Drivers
DO13-555R	55-57 Nomad - Pass

* with Bel Air Trim Holes

CHEVY IMPALA BUMPERS

BU13-62F	1962 Front 3pc
BU13-62R	1962 Rear 3-pc
BU13-621F	1962 Front California Style 1-pc
BU13-621R	1962 Rear California Style 1-pc
BU13-63F	1963 Front 3pc
BU13-63R	1963 Rear 3pc
BU13-64F	1964 Front 3pc
BU13-64R	1964 Rear 3pc
BU13-641F	1964 Front California Style 1-pc
BU13-641R	1964 Rear California Style 1-pc
BU13-65F	1965 Front 3pc
BU13-65R	1965 Rear 3pc
BU13-66F	1966 Front 3pc
BU13-66R	1966 Rear 3pc

CHEVY IMPALA HEADLAMP BUCKET

HL13-61L	1961 Botom Filler Panel - Dr
HL13-61R	1961 Botom Filler Panel - Ps

CHEVY IMPALA DOORS

DO13-63L	1963 Impala Door - Drivers
DO13-63R	1963 Impala Door - Pass
DO13-64L	1964 Impala Door - Drivers
DO13-64R	1964 Impala Door - Pass

IMPALA QUARTER PANELS

QP13-64LOE	1964 Impala Full Panel - Driver
QP13-64ROE	1964 Impala Full Panel - Pass
QP13-65L	1965 Impala Skin - Drivers
QP13-65R	1965 Impala Skin - Pass
QP13-66L	1966 Impala Skin - Drivers
QP13-66R	1966 Impala Skin - Pass
QP13-69L	1969-70 Impala Skin - Driver
QP13-69R	1969-70 Impala Skin - Pass
QP13-71L	1971-73 Impala Skin - Driver
QP13-71R	1971-73 Impala Skin - Pass
QP13-74L	1974-76 Impala Skin - Driver
QP13-74R	1974-76 Impala Skin - Pass

CHEVY IMPALA FENDERS

FE13-63L	1963 Impala - Drivers
FE13-63R	1963 Impala - Pass
FE13-64L	1964 Impala - Drivers
FE13-64R	1964 Impala - Pass

IMPALA FLOOR PANS

FP13-65L	1965-70 Floor Panel - Drivers
FP13-65R	1965-70 Floor Panel - Pass
FP13-65BB	1965-70 Floor Pan Brace - Rear
FP13-65BC	1965-70 Floor Pan Brace - Center
FP13-65BF	1965-70 Floor Pan Brace - Front

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BY **NICK LICATA**

BALANCING ACT

As we head deep into the fourth year of this magazine's existence, I figured now would be a good time to take a moment and reach out to our loyal readers—that's you—to make sure we are checking all the appropriate boxes when it comes to providing the content you like to see and read about in *All Chevy Performance* magazine. It's going to require a little work on your part, as I'd like you to answer a few questions. The good thing is that questions are easy and there is no wrong answer—my favorite kind of tests in high school.

So, let's get started.

Do you buy *All Chevy Performance* magazine for: A. car features, B. tech articles, or C. event coverage?

For those of you who read this magazine for the tech articles, which do you prefer most: engine tech, suspension and brake articles, paint and body tips, electrical pieces, or are you interested in all technical aspects regarding classic Chevy muscle cars?

For the engine guys, which engines do you prefer to read and learn about most: LS, LT, small-block, or big-block?

On the suspension side, do you want to see more full chassis installs or are you after more bolt-on suspension articles?

What is your favorite model of classic Chevy: Camaro, Chevelle, Nova, Tri-Five, fullsize, or do you just dig all classic Chevys?

When it comes to build style, what do you like most: Pro Touring, Pro Street, Day Two restorations, gassers, mild restomods, concourse restorations, or wild street machines?

Do you like to see features on high-end cars or do you prefer rides built by the "average Joe" in his home garage or small shop?

As I've stated before, more times than once, most likely, I personally appreciate what the high-end builders can accomplish with exceptional talent and a creative mind. Most come up with some brilliantly creative hot rods, and even though they may be out of financial reach for the typical muscle car enthusiasts (me), I admire their ability to stretch the bounds of imagination that began as a rusty carcass once left for dead. Many of these builds start with a general concept that requires refinement from a forward-thinking automotive artist who can interpret what the builder had in mind and get that idea on paper. That idea then becomes reality, typically after years of precise custom fabrication and countless hours of bodywork prior to hitting the paint booth. Sometimes these cars come to fruition via a staff of expert fabricators, bodywork specialists, and painters, while others come from a modest two-man shop built with tons of passion and persistence.

With that said, I equally appreciate a solid homebuilt muscle car coming from one person armed with just a vision and limited resources, who is able to take advantage of top-quality parts offered by the aftermarket.

So, if you don't mind, please take a few minutes to answer the questions above to let me know if we are delivering the Chevy muscle car content that you expect from *All Chevy Performance* magazine.

I'm at nlicata@inthegaragemedia.com, and I'm looking forward to hearing from you.

You in?

I want to hear from you! Send an email to **nlicata@inthegaragemedia.com**.

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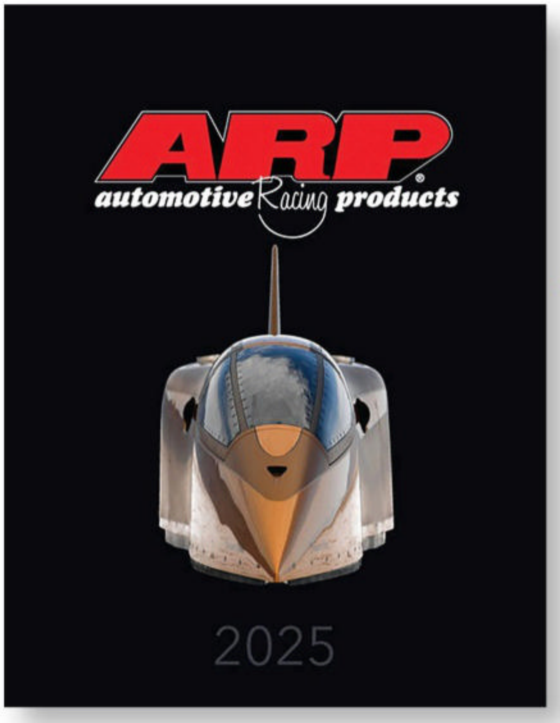

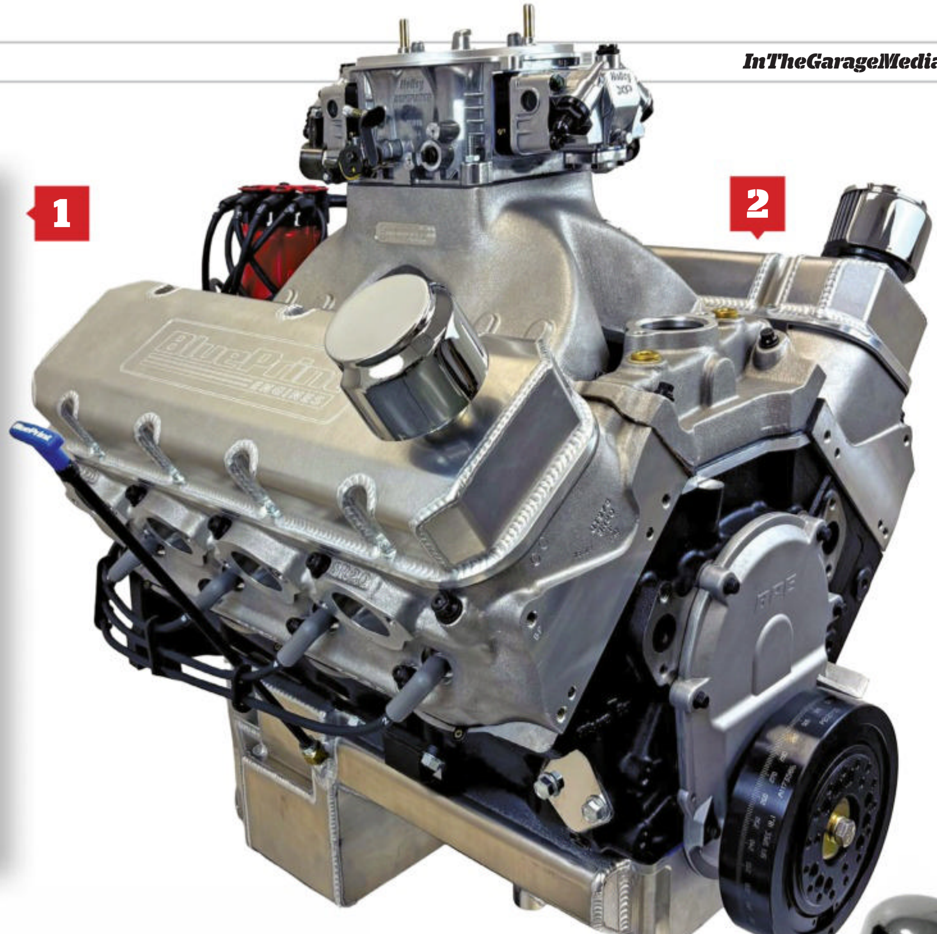

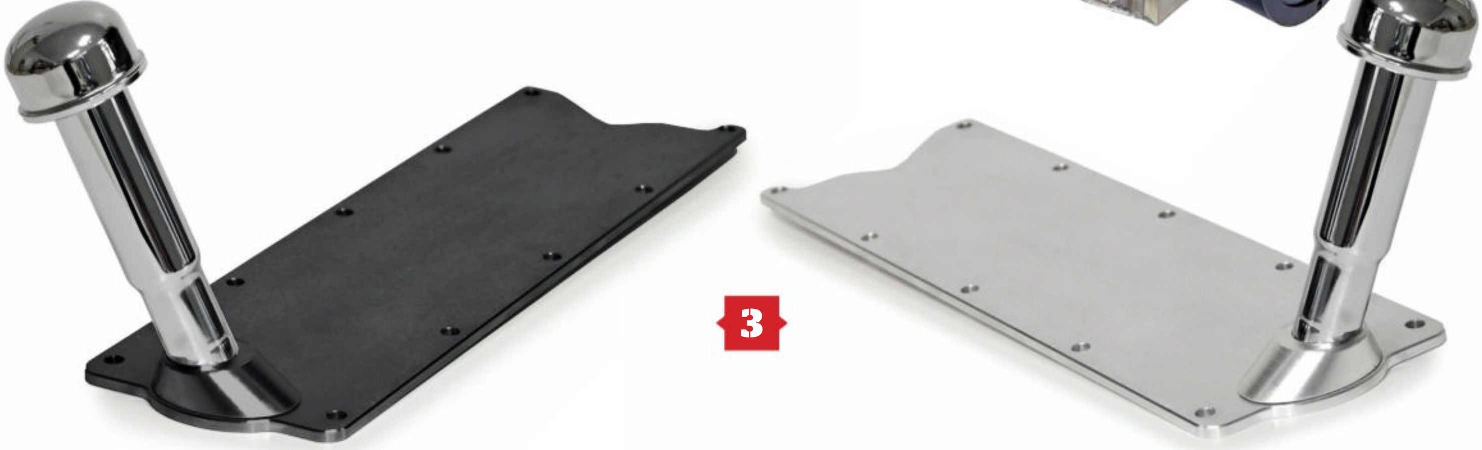

1. CATALOG WITH A BONUS

ARP's 2025 full-line catalog is now available, featuring over 5,500 fastener kits in a 180-page, full-color publication. It includes a 22x11-inch pull-out poster of the "Speed Demon" streamliner and an extensive technical section on fastener science and usage. The catalog covers engine, driveline, and accessory fasteners, along with specialty products and tools.

It can be viewed online, downloaded as a PDF, or requested in print at **arp-bolts.com** or by calling **(800) 826-3045**.

2. BIG-BLOCK CHEVY CRATE ENGINE UNLEASHED

BluePrint Engines delivers 1,015 hp and 830 lb-ft of torque with the 632ci big-block Chevy crate engine. Built for serious performance, it features a BluePrint cast-iron block, forged internals, Brodix SR20 CNC-ported heads, and a solid roller camshaft. Available with Holley Dominator carburetion or Holley Sniper EFI, this powerhouse is ready to transform any muscle car or truck into a beast. Drop in 1,000 hp today!

For more information, contact Summit Racing by calling **(800) 230-3030** or visit **summitracing.com**.

3. VINTAGE VIBES FOR YOUR MODERN LS ENGINE

LS Classic Series' Oil Fill Valley Plates feature a functional OEM-style chrome oil fill tube and breather cap reminiscent of the classic American engines that defined the golden age of hot rodding. They recently introduced an integrated air/oil separator to their popular LS valley plates. Not only do these valley plates look great, but the baffling also keeps oil out of the intake system with no catch can to empty.

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4. LT ENGINE MODULAR VALVE COVERS

Billet Specialties introduces its Gen V Modular Valve Covers designed to hide unsightly coils while enhancing LT engine aesthetics. Featuring a two-piece design, the lower cover integrates coil mounts while the top adds a sleek finish. Crafted from 6061-T6 billet aluminum, they come in Mirror Polished or Black Anodized finishes. Each set includes polished ARP stainless fasteners, a billet oil fill cap, and a ¼ NPT provision. The new top design allows easy removal without disconnecting coil wires.

For more information, contact Billet Specialties by calling **(800) 245-5382** or visit **billetspecialties.com**.

5. LATE-MODEL CAMARO SUSPENSION UPGRADE

Ridetech introduces monotube coilovers and an adjustable rear sway bar for the 2016-24 Chevrolet Camaro, enhancing performance and ride quality. The coilovers feature ride height adjustability, a rubber-isolated spherical bearing to reduce NVH, and 24-position rebound adjustment with Fox Factory internals. The adjustable rear sway bar improves balance with a three-position design and a 1.125-inch diameter for increased stiffness. Designed for spirited driving, track days, and drag racing, this upgrade delivers ultimate Camaro handling.

For more information, contact Ridetech by calling **(812) 482-2932** or visit **ridetech.com**.

6. ULTIMATE PAINT PROTECTION

Mothers High Performance Car Care introduces the California Gold Ceramic line, a cutting-edge trio designed to simplify ceramic protection. The lineup includes Ceramic Wash & Wax, Ceramic Paint Correction, and Ceramic Spray Wax, each enhancing shine, depth, and hydrophobic protection. From effortless washing to flawless paint correction and long-lasting ceramic coatings, this system makes premium paint care easy. It's ceramic made simple!

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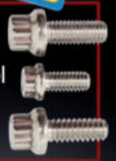

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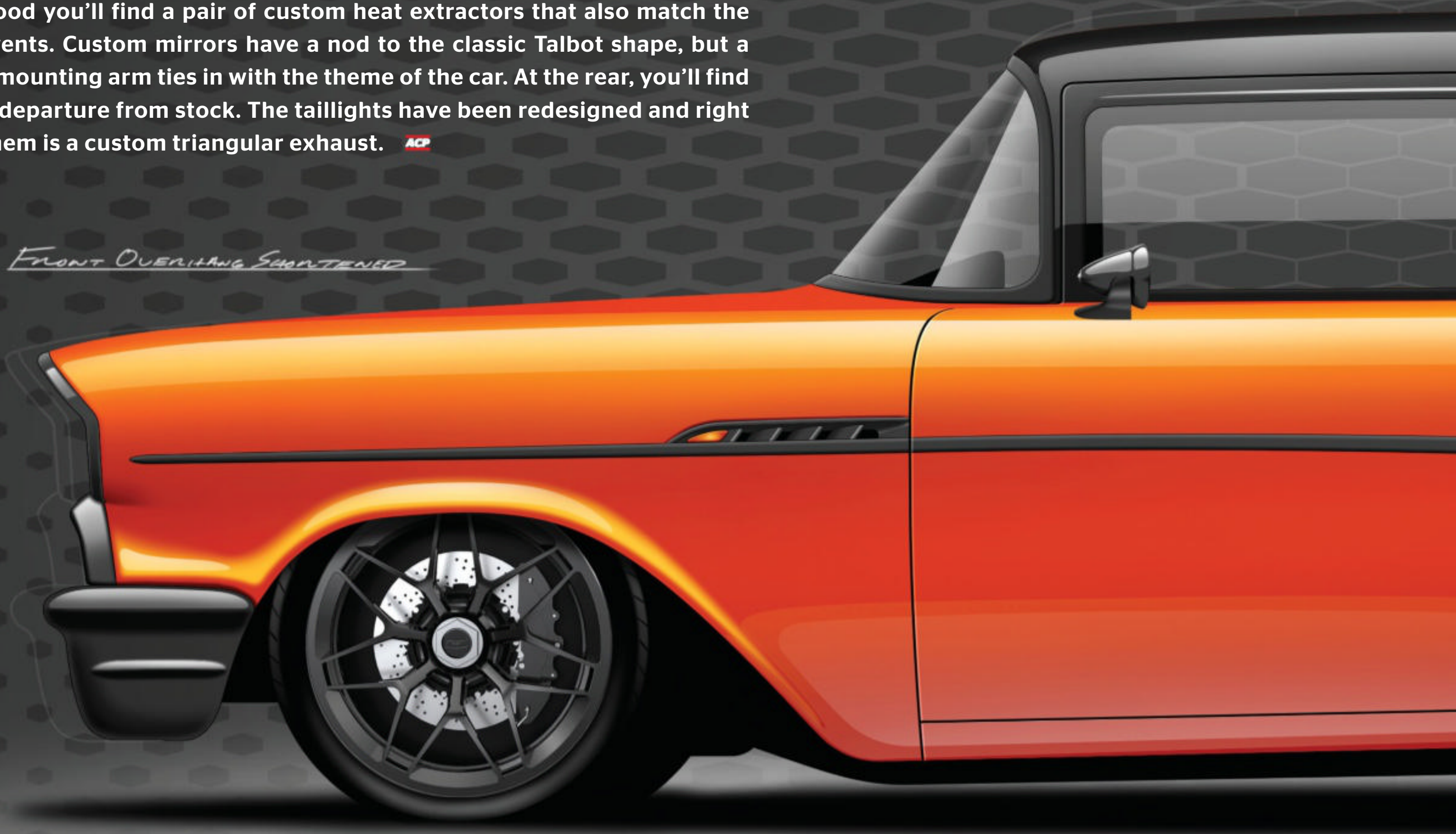
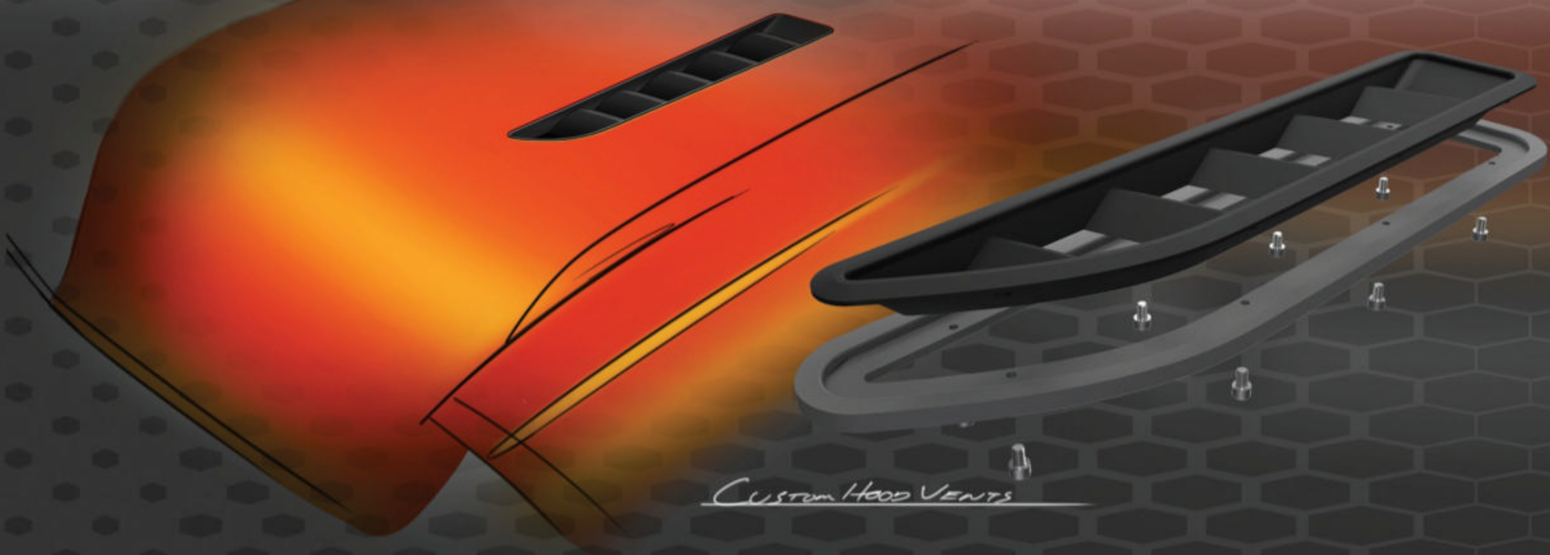
TEXT & RENDERING BY **TAVIS HIGHLANDER**

This '57 is in your face right from the get-go. Bright metallic orange paint mixes with black trim accents to create a modern twist on the classic shape. Modifications to the body will include a shortened front overhang with the front wheels pushed forward just a bit. The roof will have some of the mass removed by flattening the overall curve that it follows.

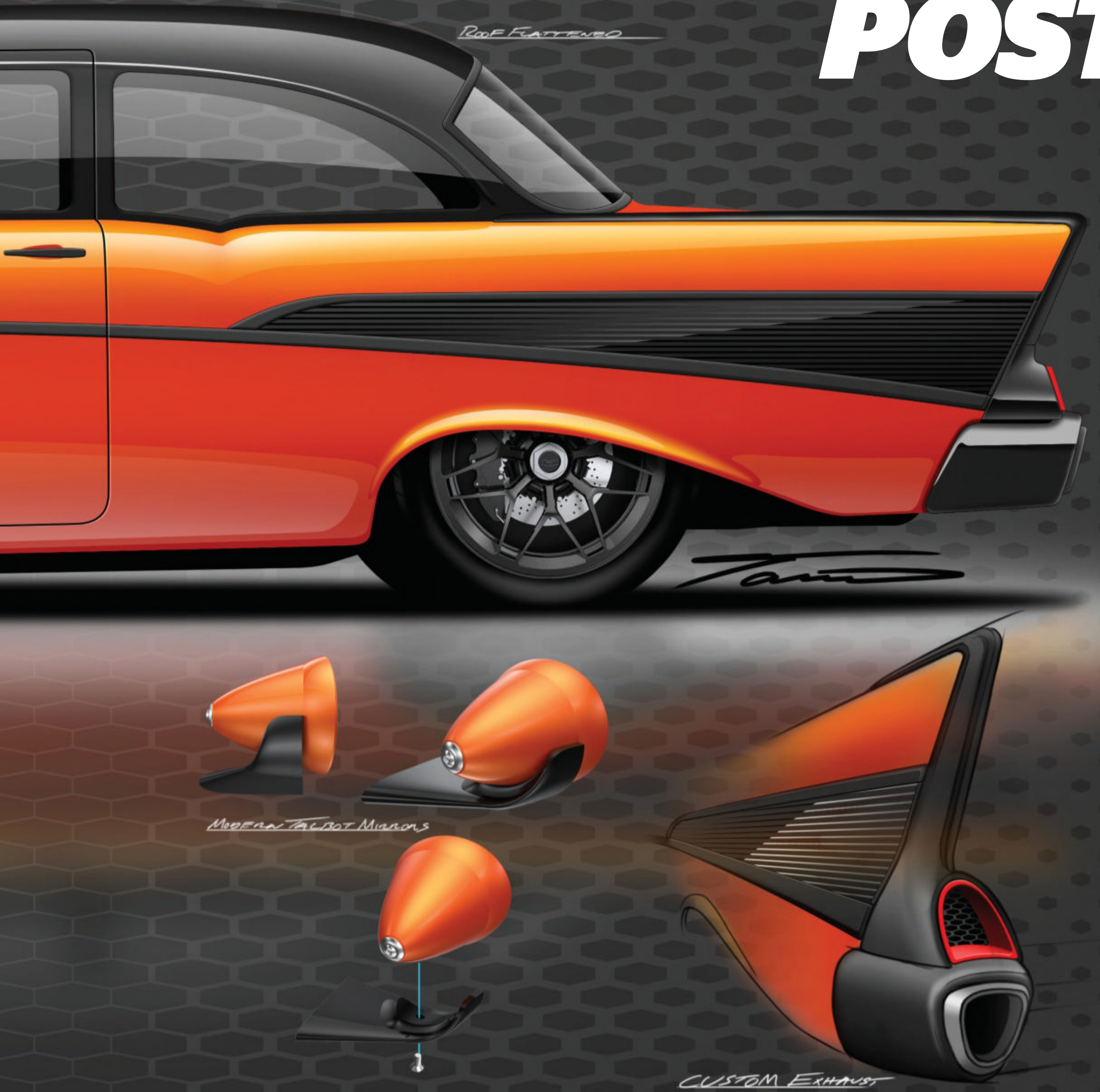
In the hood you'll find a pair of custom heat extractors that also match the fender vents. Custom mirrors have a nod to the classic Talbot shape, but a custom mounting arm ties in with the theme of the car. At the rear, you'll find a heavy departure from stock. The taillights have been redesigned and right below them is a custom triangular exhaust.





@TavisHighlander TavisHighlander.com
Builder: Ironworks Speed & Kustom (Bakersfield, CA)
Owner: Leo Santana

1957 CHEVROLET POST


ROOF FLATTENED
MODERN TALBOT MIRRORS
CUSTOM EXHAUST

BY **NICK LICATA** ■ IMAGES BY **NOTSTOCK PHOTOGRAPHY**

PROMISE KEPT

SS
CHEVELLE

Lucky or smart? That's the question when considering Ryan Gebhardt and his remarkable journey with his very first car. Almost 40 years ago Ryan's purchase of a 1971 Chevelle SS as a teenager set the stage for a decades-long story that intertwined family memories, professional growth, and a relentless passion for cars.

"I purchased the car when I was 14 years old with money I made from mowing lawns," Ryan reveals. "It was in 1987 when I found the Chevelle behind a used car lot building in Blountville, Tennessee. The original color was Placer Gold with a matching gold interior. It was an SS big-block car with a 454, four-speed, a 12-bolt rearend."

Having to dish out only $700 for the car may sound like Ryan landed a bargain of a buy, but it was extremely rough and was far from running condition. In fact, Ryan spent the first year of ownership removing everything under the hood and inside the car all the way down to the chassis.

"While cleaning the exterior of the bellhousing with a wire brush, I was hoping I'd be able to remember how to put it all back together, Ryan states. "My father, Paul, helped me understand the intricacies of engine components and vehicle mechanics while we rebuilt each section of the car, including the construction of a 350ci small-block. We also refreshed the thrashed interior and had the car painted black with SS stripes."

The car served its purpose and ran great through Ryan's high school years until, in his words, he "nuked" the engine in the early '90s, sidelining the car indefinitely. That incident led to the car being parked in the driveway at his parents' house for the next 30-plus years, a project left on hold but never forgotten.

RYAN GEBHARDT'S 1971 CHEVELLE SS

GARRET'S
Rod Shop

GARRET'S
Rod Shop

Ryan recognized working alongside his father on the car sparked his interest in the automotive world and shaped his trajectory. Over the years, he gained extensive experience in the industry, from chassis setup for a late-model circle track team to working at a Chevrolet dealership in Bristol. Eventually, he advanced to roles in purchasing and marketing at a large automotive distributor and spent a decade as VP of purchasing and marketing at Jegs. Today, Ryan is the VP of sales and marketing at QA1, a testament to the lifelong passion his Chevelle helped ignite.

“I promised my mom (Susan) that I would restore the car one day and in the meantime to keep telling those who would stop by that the car was not for sale,” Ryan recounts. “That time finally came in 2018 when I brought the car to Garret’s Rod Shop in Columbus, Ohio.”

Garret’s Rod Shop undertook a meticulous restoration and modification process to transform the aging Chevelle into a modernized masterpiece while still retaining its classic style.

The heart of Ryan’s Chevelle consists of a 496ci big-block machined by PAR Race Engines in Spartanburg, South Carolina, and assembled by M&H Machine in Delaware, Ohio. The engine is armed with an upgraded rotating assembly, including Manley crank and rods and JE pistons. Also on board is a Comp Cams hydraulic roller cam and Brodix aluminum heads. An Edelbrock Pro-Flo 4 EFI system is complemented by ceramic-coated Hedman Hedders and MagnaFlow 3-inch exhaust with electric cutouts. With a hefty 650 hp and 625 lb-ft of torque available on call, not only is the car a beast on the street, but the Chevelle’s previously unpredictable nature has become predictably reliable as Ryan now claims it’s a joy to take on long drives with his wife, Kendra, and his son, Seth.

The drivetrain features a Chevrolet 4L85E transmission with a TCI 3,000-stall torque converter, paired with a 12-bolt rear axle equipped with a Detroit Truetrac differential, Yukon 3.73 gears, and Moser 35-spline axles.

The car currently rolls on an air suspension system, but plans include a full QA1 coilover suspension makeover for a more performance-oriented ride. Speedtech’s boxed frame kit was used to strengthen the chassis, while Baer disc brakes provide superb stopping power.

Billet Specialties Reaper Extreme wheels, sized 19x10 in the front and 20x12 in the rear, are wrapped in Michelin Super Sport tires (275/35R19 front, 345/30R20 rear), delivering both style and performance.

TENNESSEE STOMPER
496
Chevrolet

The Chevelle's interior received a stylish upgrade thanks to Steve Holcomb at Pro Auto Custom Interiors in Knoxville, Tennessee. Custom red leather upholstery enhances the factory seats and door panels, while a Dakota Digital instrument cluster and Vintage Air system add modern functionality. A factory Horseshoe shifter, Ididit steering column, and Billet Specialties Reaper steering wheel complete the retro-modern vibe. The original 8-track player remains, now paired with a Kicker Bluetooth system for seamless audio integration.

Garret's Rod Shop executed the exterior restoration, with Axalta paint bringing the body to life in a stunning deep black finish. Subtle modifications include a front bumper diffuser, a rear valance modified for exhaust tip exits, and a front spoiler. Auto Metal Direct supplied the replacement bumpers and Advanced Plating provided the brilliant chrome finish.

"The car has brought so many great memories, but cruising the strip in Bristol, Tennessee, with my best friends back in my high school days was the best," Ryan reminisces. "On weekends we would cruise in and out of all the restaurants and large parking lots. There was always a massive number of cars and hot rods cruising the streets back then, and of course we'd go stoplight to stoplight, going up against Mustangs mostly. My friends and I still talk about the great times we had back then."

From a $700 fixer-upper, to a killer 650hp street machine, Ryan's Chevelle is a testament to the enduring bond between man and machine that will carry on for many more road miles, only a lot faster and way more reliable than before.

Ryan's mom, Susan, died in 2012, but he finally fulfilled his promise of restoring the car. "I hope she can see it from heaven, as I always like to say that this build is a promise kept."

TECH ✓

OWNER: Ryan Gebhardt, Jonesborough, Tennessee
VEHICLE: 1971 Chevelle SS

Engine

TYPE: 1971 Chevrolet big-block
DISPLACEMENT: 496 ci
COMPRESSION RATIO: 10.1:1
BORE: 4.310
STROKE: 4.250
MACHINE WORK: PAR Race Engines (Spartanburg, SC)
ASSEMBLY: M&H Machine (Delaware, OH)
ROTATING ASSEMBLY: Forged Manley crankshaft, forged Manley rods, JE pistons
VALVETRAIN: Comp Cams valvesprings, rocker arms, and pushrods
CAMSHAFT: Comp Cams hydraulic roller, 0.578/0.608 lift, 238/248 duration at 0.050
CYLINDER HEADS: Brodix Race Rite aluminum
INDUCTION: Edelbrock EFI intake
FUEL INJECTION: Edelbrock Pro-Flo 4
VALVE COVERS: Billet Specialties
EXHAUST: Hedman ceramic-coated Hedders, MagnaFlow 3-inch exhaust, MagnaFlow mufflers with electric cutouts
ACCESSORY DRIVE: Holley
ANCILLARIES: Holley water pump, Spal dual electric fans, Billet Specialties Vintage Air air cleaner, Edelbrock ignition, Edelbrock wires, Ringbrothers Air Frame hood hinges
OUTPUT: 650 hp, 625 lb-ft of torque

Drivetrain

TRANSMISSION: Chevrolet 4L85E
TORQUE CONVERTER: 3,000-stall TCI
SHIFTER: Shiftworks
REAR AXLE: Chevrolet 12-bolt, Detroit Truetrac differential, Yukon 3.73 gears, Moser 35-spline axles

Chassis

FRONT SUSPENSION: Air suspension system, Unisteer rack-and-pinion steering
REAR SUSPENSION: Air suspension system
BRAKES: Baer 12-inch rotors, six-piston calipers front, 12-inch rotors, four-piston calipers rear
SUSPENSION MODS: Speedtech boxed frame kit, frame narrowed and recessed for rear tub kit

Wheels & Tires

WHEELS: Billet Specialties Reaper Extreme, 19x10 front, 20x12 rear
TIRES: Michelin Super Sport 275/35R19 front, 345/30R20

Interior

UPHOLSTERY: Custom red leather
INSTALLATION: Steve Holcomb at Pro Auto Custom Interiors (Knoxville, TN)
SEATS: Factory
DOOR PANELS: Custom
STEERING: Ididit steering column, Billet Specialties Reaper steering wheel
SHIFTER: Factory Horseshoe
DASH: Factory
INSTRUMENTATION: Dakota Digital
WIRING: American Autowire by Garret's Rod Shop
HVAC: Vintage Air
CONTROL PANEL: Vintage Air
ENTERTAINMENT SYSTEM: OEM 8-track, Kicker Bluetooth system, Kicker amplifiers, Kicker speakers and sub

Exterior

BODYWORK & PAINT: Garret's Rod Shop
PAINT: Axalta
FRONT BUMPER: Auto Metal Direct
REAR BUMPER: Auto Metal Direct
PLATING: Advanced Plating
MOD MODS: Added front spoiler, front bumper diffuser, rear valance modified for exhaust tip exits

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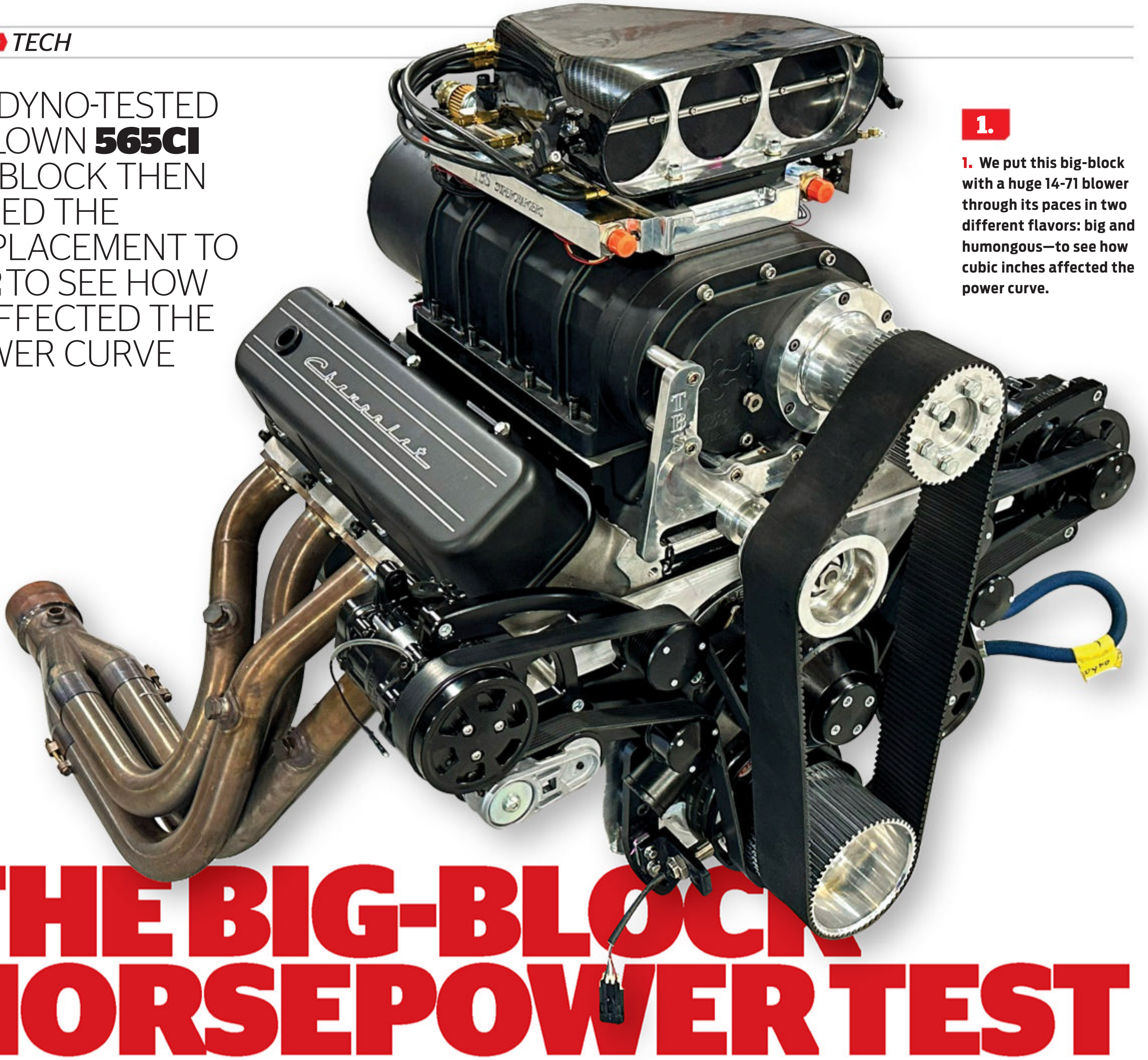
WE DYNO-TESTED A BLOWN **565CI** BIG-BLOCK THEN UPPED THE DISPLACEMENT TO **632** TO SEE HOW IT AFFECTED THE POWER CURVE



1.

1. We put this big-block with a huge 14-71 blower through its paces in two different flavors: big and humongous—to see how cubic inches affected the power curve.

THE BIG-BLOCK HORSEPOWER TEST

BY **JEFF HUNEYCUTT** ◼ IMAGES BY **THE AUTHOR**

The old adage about making power goes: "There's no replacement for displacement."

Every dyed-in-the-wool car guy knows it. We've all heard it. And we all know the rejoinder is: "Unless you have boost."

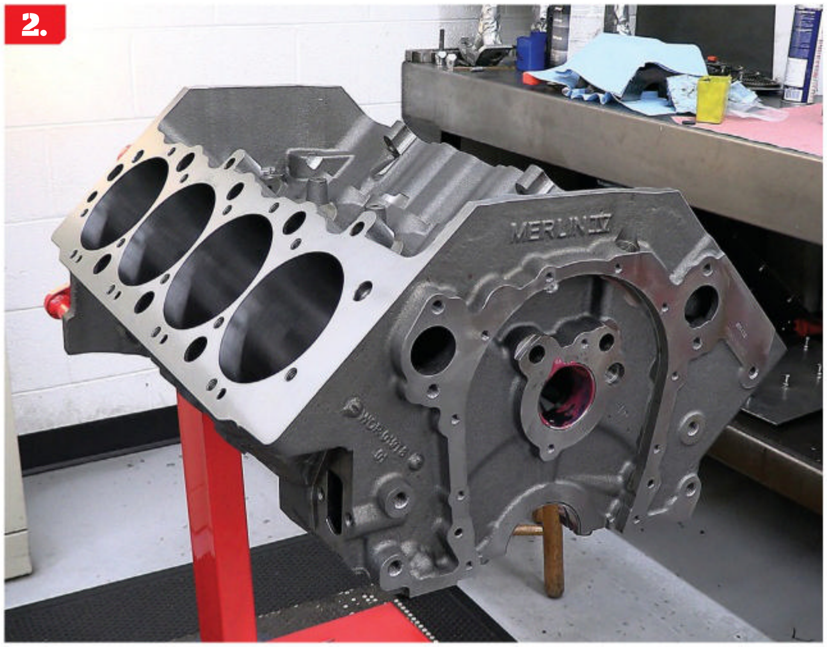
Yes, boost is the answer when it comes to helping little engines make big power. Whether it's a supercharger or turbo, boost makes magic happen. So, what happens when you have both? What happens when you already have boost and add displacement? That, friends, is the question of the day.

We recently came across a golden opportunity to put this to the test and couldn't pass up the chance to do a little dyno testing. This became possible when our friends at Automotive Specialists in Concord, North Carolina, were sent a new engine build that the original engine builder was having trouble tuning on the dyno. The engine was a 565ci big-block with a giant 14-71 blower from The Blower Shop (TBS).

EFI and cylinder head specialist Jeff Dorton had the engine with a Holley Dominator ECU up and running in no time. With a little tuning, the engine was able to make peaks of 1,111.4 hp at 6,500 rpm and 940.4 lb-ft of torque at 5,500. That is plenty for most of us, but the engine's owner was unhappy. He was led to believe the engine would make over 1,200 hp and was surprised to find that the displacement was just 565 ci and not 632 like he wanted.

So, the owner asked Automotive Specialists to keep the engine and fix the issues. To help keep costs contained, together they made the decision to build a brand-new, 632ci short-block and use the cylinder head, blower, and other components. Then the old short-block, which was still perfectly good, could be sold or used on another project.

2.



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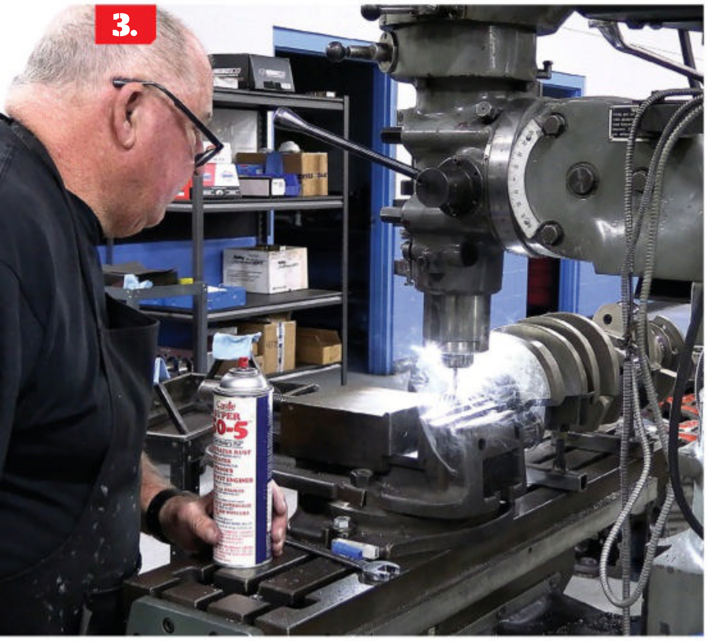

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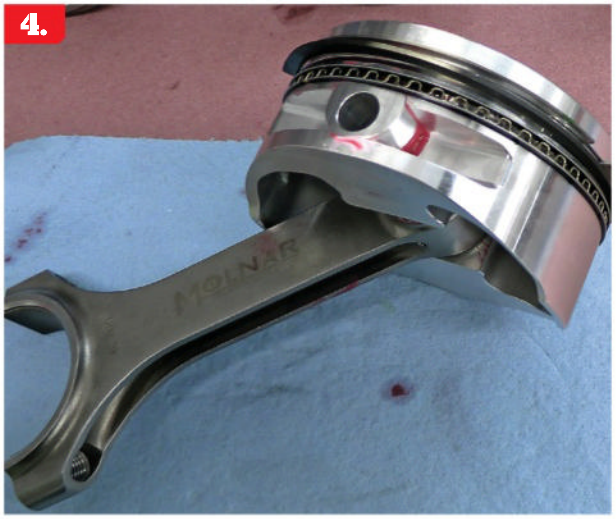


2. The baseline for both builds includes a World Products Merlin IV cast-iron block that can handle huge power without an issue. The 10.2 deck height is also critical in order to squeeze in the 4.750 inches of sweep needed to get to 632 ci.

3. Engine builder Keith Dorton cuts a second keyway into the snout of the forged Molnar stroker crank because of the resistance that comes from spinning a blower too much for a single keyway and woodruff key to handle.

4. The pistons are flat tops from JE. As you can see, the compression height for the rings has been minimized to fit in the longest connecting rod possible, so an insert is used in the wristpin bores to help support the oil ring. The forged H-beam connecting rods are from Molnar Technologies and measure out at 6.700 inches long.

That's great news for us because rarely does an engine go across the dyno twice with a single significant change that we can test. It's just too costly in terms of both time and money. Since both versions will be on the same dyno, it's an excellent opportunity to see just how those additional cubic inches will affect the power curve—especially considering we're adding boost to the equation.

Yes, both horsepower and torque should go up. But how much? And will the upper rpm range or the lower be more affected? Typically, the horsepower-per-cubic-inch ratio decreases as the cubic inches go up (that's why it's usually unfair to compare horsepower per cubic inch between a tiny four-cylinder and a big-inch V-8), so since this is one of the biggest gasoline street engines you can build, will the horsepower improvements be disappointing?

Only one way to find out.

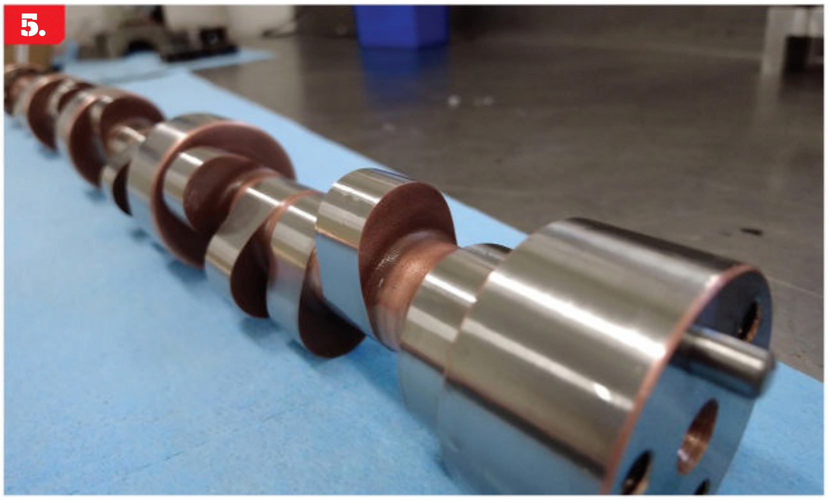
The 565ci Chevrolet big-block usually is derived with a 4.600-inch bore and 4.250-inch stroke. Even for an aftermarket block, 4.625 inches is usually the absolute limit for the bore size, so for a 632ci engine with an additional 67 ci, the 4.600-inch bore is kept while the stroke is lengthened a full ½ inch to 4.750. That, of course, basically requires a 10.200-inch tall-deck block to fit all the stroke without crashing piston skirts into the crankshaft's counterweights at BDC.

In addition to the cubic inches, the additional stroke also makes for a couple of other differences. The big one is compression ratio—both the original configuration and Automotive Specialists' updated 632 used flat-top pistons. The same Brodix cylinder heads with 123cc combustion chambers were also kept. So, thanks to the extra stroke, compression ratio jumped from 8.8:1 for the 565 build to 9.64:1 for the 632.

You might think that this negates the test to see how cubic inches affect power, but we'd disagree. Increased compression is a natural by-product of adding cubic inches. You'd actually have to make additional changes to lower compression again, so in our book more inches and higher compression go hand-in-hand.

Another change that's a by-product of the additional stroke is the rod/stroke ratio. A lot of people place a lot more importance into rod/stroke ratio than we do, so we'll touch on it. The 565 combo in a 10.2-inch deck height block is a 4.250-inch stroke with 6.800-long connecting rods. That makes the rod/stroke ratio 1.6:1. The 632 with the same block uses a 4.750-inch stroke with slightly shorter 6.700 rods. As a result, the ratio dips to 1.4:1. Whether that is a little or a lot depends on your perspective (for comparison, a stock stroke 350 Chevy small-block with 5.7-inch connecting rods is also 1.6:1), but the change in ratio really won't affect power production. If anything, it is more of a long-term concern because the shortened ratio will increase lateral loading between the pistons and the cylinder wall, and bore wear eventually becomes something to keep an eye on.

5.



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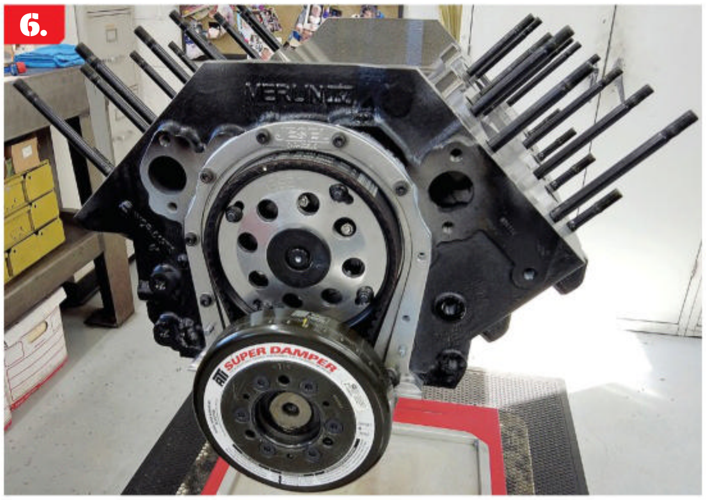

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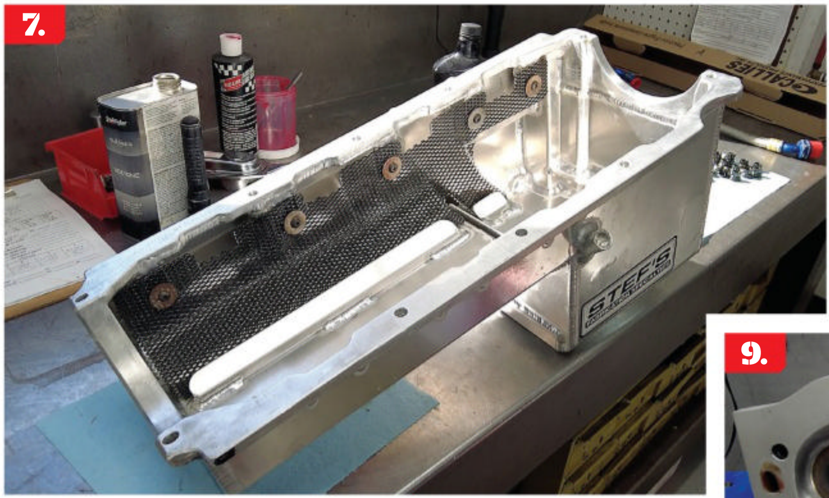
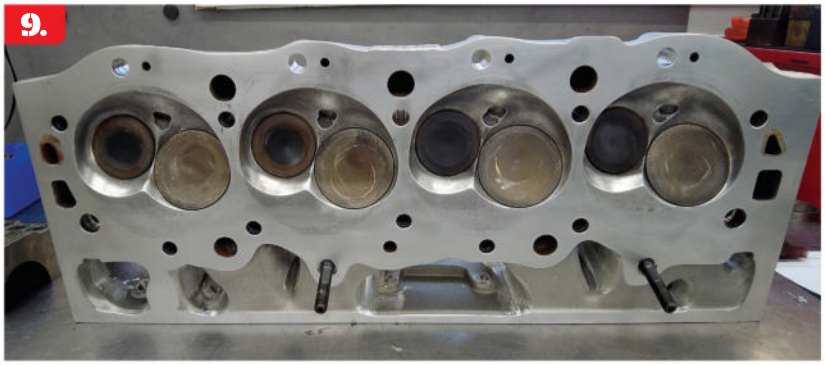


5. Both cams were quite similar, but Dorton switched to a small base circle cam from Jones Cam Designs for the 632 to make a little more clearance for the connecting rods to swing by. This one is ground with 278/285 degrees of duration at 0.050 tappet lift, 0.425-inch lobe lift, and a 110-degree intake centerline.

6. A highly efficient Jesel belt drive controls the cam timing. You can also see the ARP studs in place to help keep the cylinder heads clamped to the deck when the boost rises.

7. A fully fabricated Stef's aluminum oil pan provides enough room for the long-stroke crankshaft. It also has a deep sump to be able to maintain a good supply of oil for the engine even when the revs are up for long periods of time.

9.



8.

8. Windage can be a big issue with stroker engines because the crankshaft has a deeper swing into the oil pan. To help minimize its effects, the Stef's pan kicks out the side of the pan to give room for the oil to sling off the crank and not bounce right back onto it. In order to secure the pan to the block, it is necessary to run the bolts through the pan. The holes are either sleeved to seal out oil or threaded so that plugs can be installed after the bolts are tight.

9. The cylinder heads are a set of 24-degree Head Hunters from Brodix. The chambers are large at 123 cc, making the final compression ratio for the 632 engine 9.64:1. The valves are sized at 2.400 for the intakes and 1.850 for the exhausts. You can see the two extra studs on each head that thread into the block to provide additional clamping load.

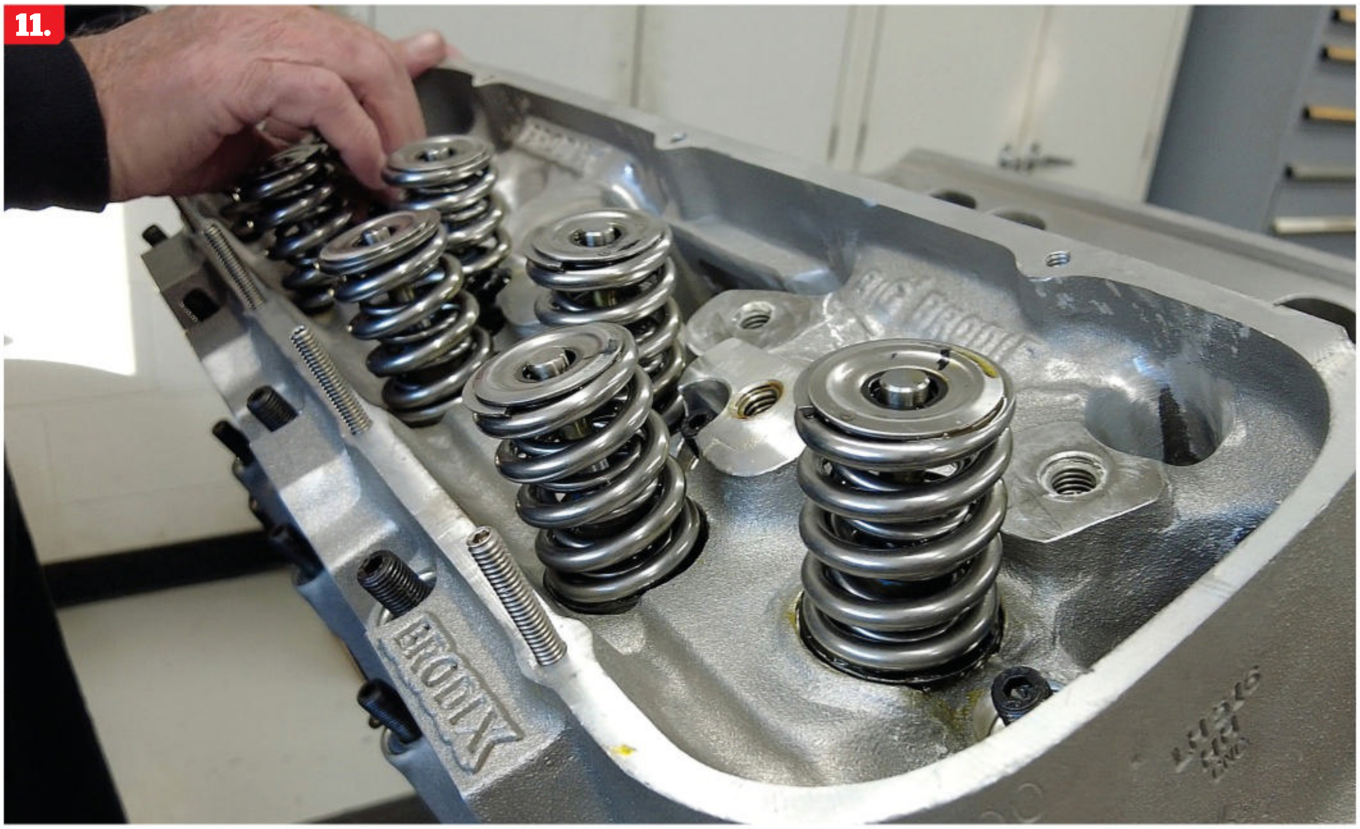
10. The Head Hunter line of cylinder heads are fully CNC-ported with a 24-degree valve angle to help flow. At our max intake lift of 0.703 inches this head can flow an impressive 455 cfm.

10.

11. The psi valvesprings with Xceldyne retainers are installed at 2.050 inches. That provides 220 pounds of seat pressure and 750 over the nose. This shot helps illustrate the big-block's canted valve angles that help improve flow into the combustion chambers and make this engine such a great performer.

12. The rocker arms are a set of Jesel's Sportsman Series aluminum-bodied rockers that mount to a very rigid steel rocker stand. They are the stock 1.7:1 ratio, so gross valve lift will be 0.723 inches.

11.



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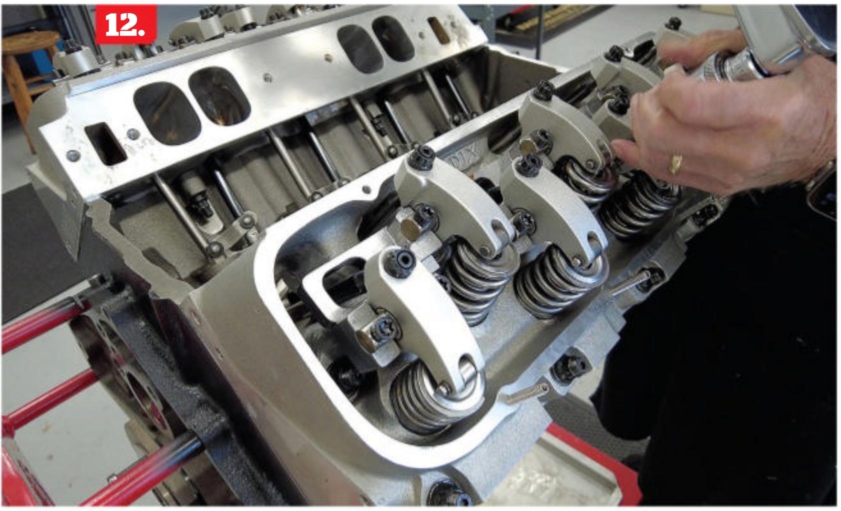

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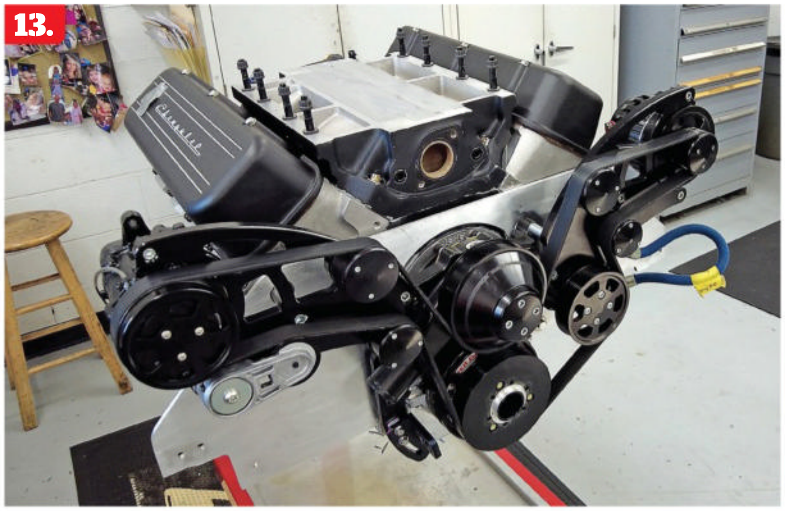

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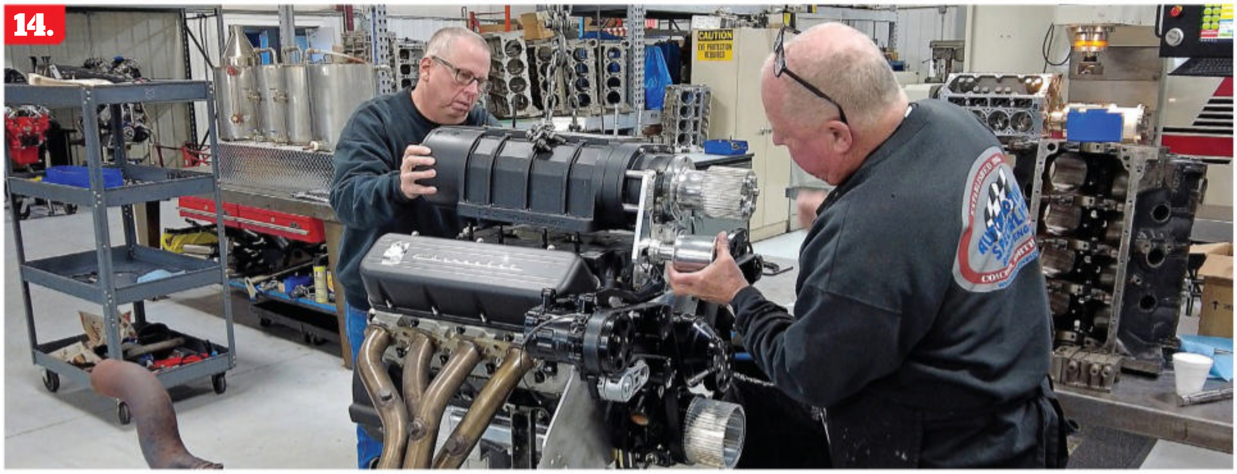
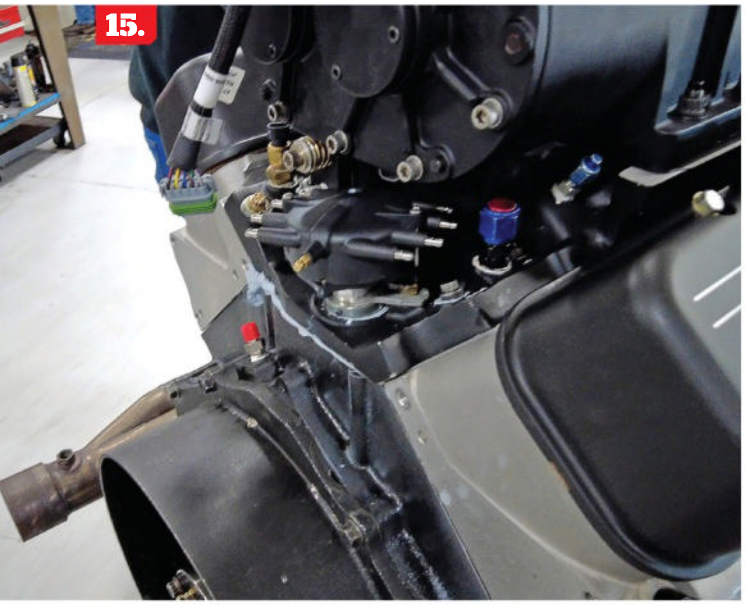


13. Although it likely won't be seeing tons of road miles, this is still a street engine. So, it's equipped with an alternator, power steering pump, and even an A/C compressor that's all driven by a serpentine belt setup from CVF Racing.

14. The giant 14-71 blower from The Blower Shop is a beast, so Jeff *(left)* and Keith Dorton use a shop crane to safely lower it in place without scratching up the mating surfaces or tearing the large gasket that seals the blower to the manifold.

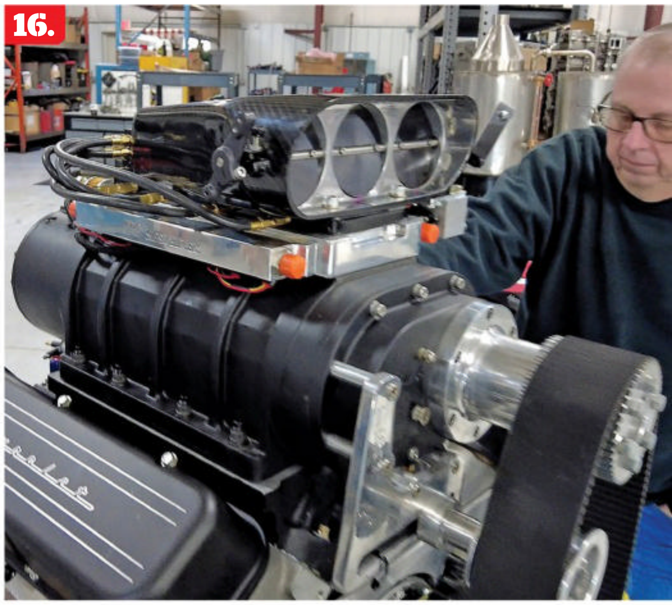
15.



15. The extreme size of the 14-71 blower means it extends over the distributor boss in the intake manifold. Not only must you use a "spider"-style cap like this, the distributor must be installed before dropping the blower in place. That big blue AN fitting cap you see also had to come off before we could fit up the plug wires.

16. The 160-lb/hr injectors are housed in the plate between the blower and the hat. Injecting the fuel above the blower and instead of in the intake runners like you normally see in a naturally aspirated engine is important because the fuel helps lubricate the spinning lobes inside the blower.

16.



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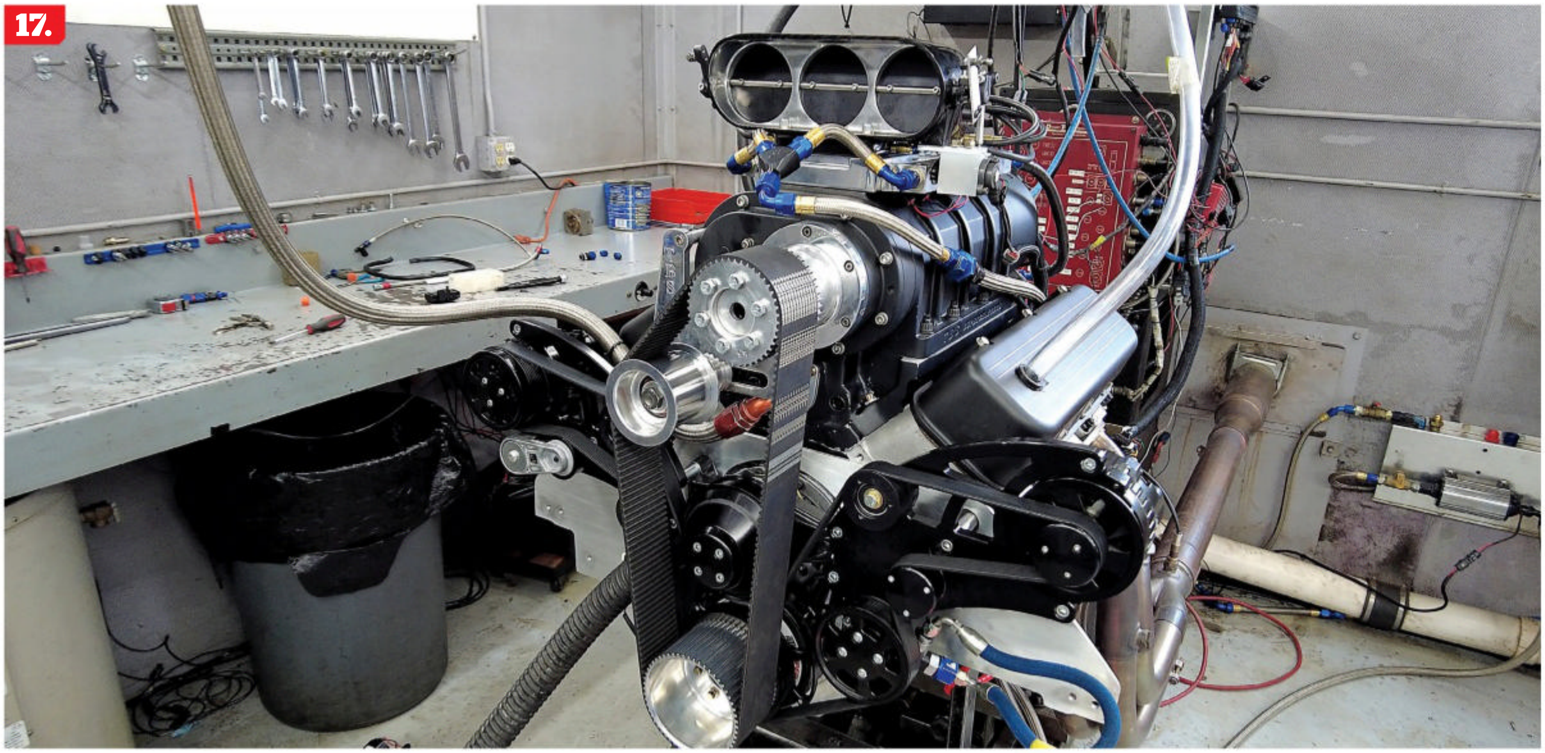

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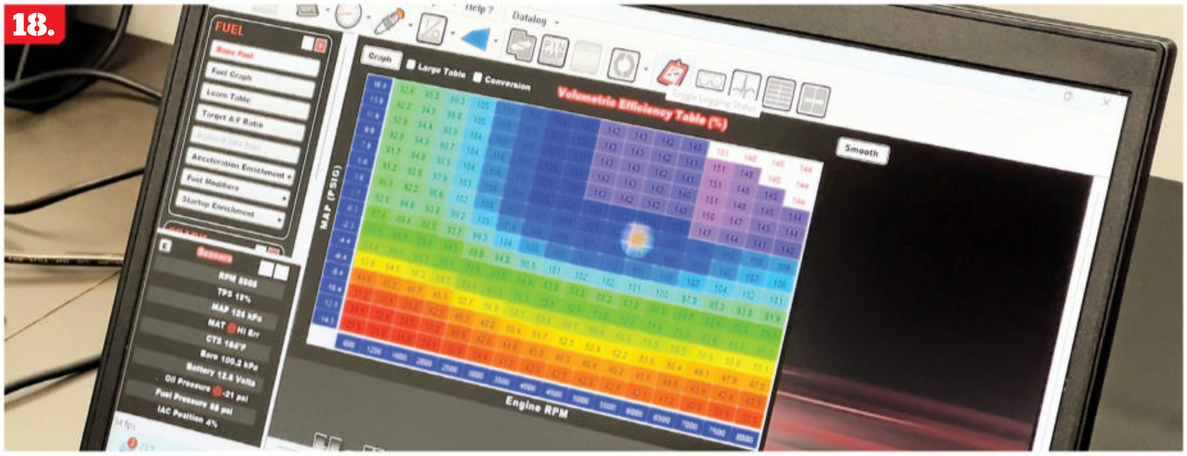

17. Here's the final setup on the dyno. The big piece of aluminum sandwiched between the block and the front drive setup is the engine plate. In the car this will be used to mount the engine to the chassis instead of the standard motor mounts. Also notice the fuel lines extending from the fuel plate. These are the fuel return lines. The fuel is provided to the system from the back of the plate. In the car this will be cleaned up for a much more sanitary look.

18. Ignition tables and fuel maps are all controlled by a Holley Dominator ECU on the engine dyno.

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Finally, there's one last change that's worth noting even though it didn't affect horsepower. Because of the additional ½ inch of stroke, engine builder Keith Dorton switched to a camshaft ground on a reduced-base circle. The basic specs were the same, just on a smaller lobe diameter to ensure that there will be no contact between the camshaft and the big ends of the connecting rods as they swing by.

So how did it do? Glad you asked.

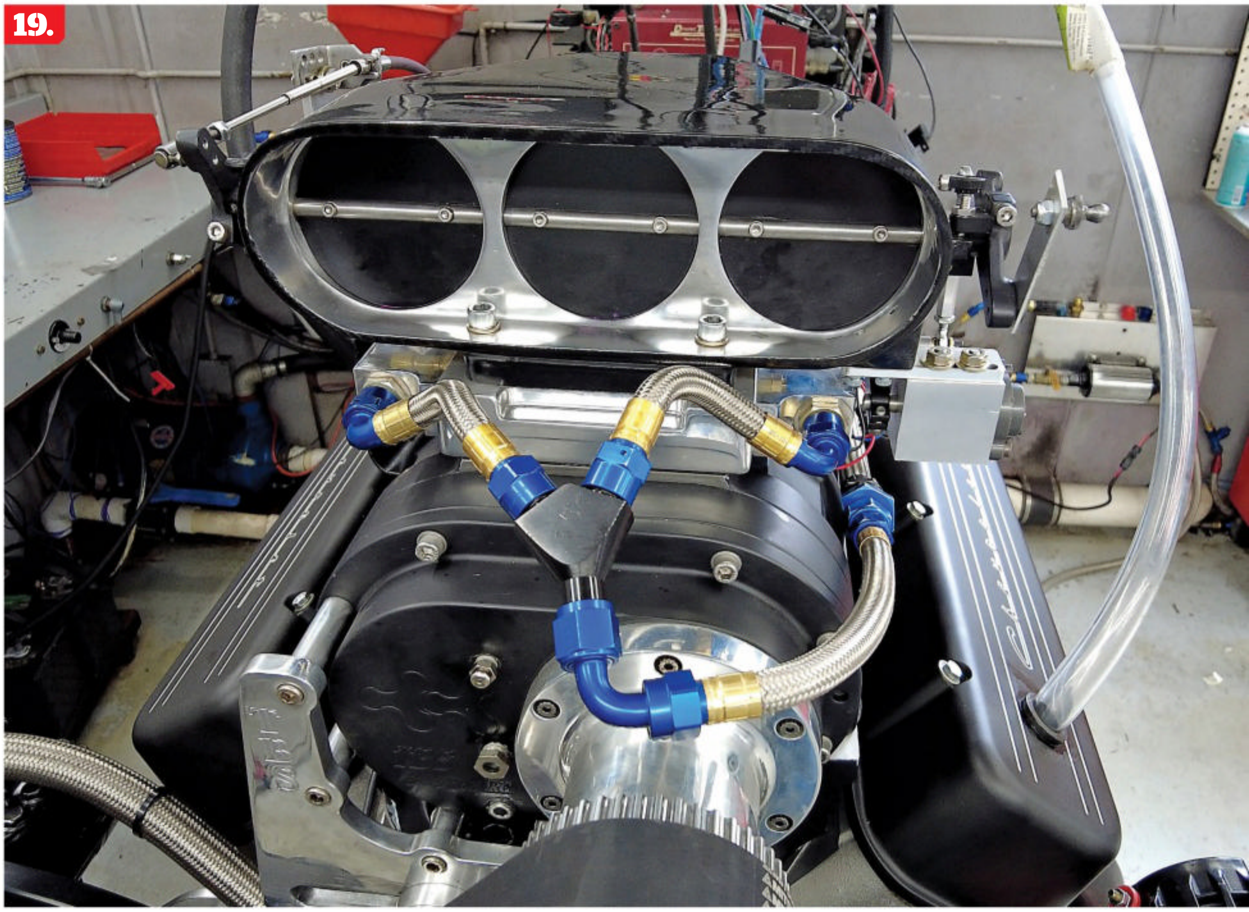
On the engine dyno with the 565ci setup we saw peaks of 1,111.4 hp and 940.4 lb-ft of torque. Because it limits the rpm ramp speed, an engine dyno can damage the pistons in a high-torque engine if you begin the pull too low in the rpm range. That's why the pull is from 5,000 to 6,500 rpm. But the averages in that range were a very healthy 1,013.3 hp and 962.2 lb-ft of torque.

Then the engine was pulled down, inspected, and cleaned, and then rebuilt with the new short-block.

When Keith and Jeff Dorton got it back on the dyno in its 632ci form, it produced peaks of 1,253 hp and 1,106 lb-ft of torque. That's improvements of 141.6 hp and 165.6 lb-ft of torque. The averages improved by 157.3 and 109.4 respectively to 1,170.6 hp and 1,071.6 lb-ft of torque.

So, the improvements are solid but not outrageous. On the dyno chart, the shape of the horsepower and torque curves were basically consistent across the pull without any real drop-off as the rpm increased. An average gain of 157.3 hp by adding 67 ci comes out to 2.35 hp/ci, which sounds about right with approximately 12 pounds of boost. We never even changed the blower pulley. If anything, there might be a little more power to be squeezed out of the 632 because the 160-lb/hr injectors were at 80 percent duty cycle. But the customer is happy with the new power numbers and can't wait to put the big-block into his Chevelle. We're happy with a great day on the dyno and need to get things cleaned up so we can bring you another engine test next time! ACP

19.



19. During the pull for the 632 version, the boost pressure was steady at 12.3 psi through much of the pull. The fact that it didn't keep climbing with the increased rpm is a sign that the engine might be choked for air. It is beyond the scope of this story, but Keith and Jeff Dorton suspected the blower hat with its three 3.75-inch openings might not allow enough airflow to properly feed a 632 equipped with a big 14-72 blower when the rpm exceeds 6,000 rpm. We were up against deadlines and the engine had to go out the door, but the owner will likely try a larger hat after the engine is in the car to see how it affects performance.

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SUPER SPORT DREAM

A 1969 CAMARO WORTH WAITING FOR

BY **FUELISH MEDIA** ◼ IMAGES BY **THE AUTHOR**

Imagine wanting a specific year, make, and model vehicle your whole life only to get ahold of one well into adulthood. Now imagine the feeling of starting the hunt for yet another car of the exact same ilk because you just can’t bring yourself to cut up and customize that first “dream” vehicle. Sometimes, these vintage cars show up in unbelievable original condition, and the simple thought of going forward with a complete breakdown for the purpose of installing aftermarket components can seem like committing a cardinal sin.

Back in 1969, John De La Luz fell in love with the Chevy Camaro of the day. At that time, he was only 12 years old and he was heavily influenced by the cars the older kids in the neighborhood were driving. “One of the guys down the street from me had a ’69 Z/28,” John remembers. “On the weekends, his friends would come over with their ’69 Camaros. I would stare at those cars and told myself one day I would have one just like them.”

SS
CALIFORNIA
YNL 366

When he was finally old enough to drive, John picked up a 1969 El Camino SS 396, then a 1970 Camaro that he completely customized, followed by other equally cool muscle cars but never the '69 Camaro that he once coveted during his youth. It wasn't until he got a little bit older (we'll let you do the math of his exact age) when he finally found the car he used to obsess over.

"I found this '69 Camaro in Glendale, California," John states. "The car was in perfect condition except for two little tears in the driver seat. I was looking for one for over a year when I heard about the car. I called about it immediately and drove it home a few days later. The previous owner bought it in 1969 when he got home from the Army. He moved in with his grandma when he got back and parked the car in her garage—he hardly ever drove it. When he [died], he left it to his nephew who is the one who put it up for sale since he wasn't much of a car guy."

With only 53,000 miles on the odometer, the true 1969 SS 350 four-speed Camaro John purchased was in near immaculate condition. He drove it pretty much in stock form, except for aftermarket wheels and tires, for nine years before he felt the itch to customize it. "My ultimate dream was to have a Pro Touring '69 Camaro, but I could never bring myself to mess around with the one I just found," he admits. "It was a perfect original car, and I just couldn't take anything apart that wasn't absolutely necessary for regular maintenance."

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Camaro

Continental

While his hopes were high for finding a project-worthy '69, John canceled his search after three years of looking. He finally succumbed to the idea of blasting his all-original car apart to build the Camaro of his wildest dreams. "My good friend Sal Solorzano from Total Cost Involved helped with completely disassembling the car," John says. "I felt a lot better about the situation once Solarzano began doing things to build the car back up, like installing a full TCI front suspension clip and rear torque arm setup."

At least the Camaro wasn't torn down in vain. John had a comprehensive plan for the project and was not about to settle for anything less than dream worthy. The new chassis situation was further upgraded with Ridetech adjustable shocks at each corner, powdercoated suspension components, Wilwood brakes, stainless lines, and plenty more to make the most of the next big addition to the Camaro's roster.

The transmission tunnel was widened, Detroit Speed mini-tubs were installed, and the firewall was smoothed to clean up the engine compartment to set the stage for a Chevrolet Performance LS7 that would be planted underhood. The 427ci powerplant was backed by a 4L75E transmission with a Circle D billet torque converter with 3,000 stall converter and a B&M shifter to put power to the ground. The engine was further upgraded with MSD fuel rails, a Nick Williams 102mm throttle body, custom LS7 headers, and a K&N air intake system to produce an estimated 650 hp.

Next, the Camaro was taken to Barry's Speed Shop where it was bodyworked and painted a fresh custom green hue as an update to its original factory Frost Green color. New front and rear glass was then installed, a Detroit Speed RS headlight conversion kit was put into place, and all the stainless accents were polished to a brilliant shine. To match that luster, a set of 18-inch Schott wheels were selected to give John's '69 a moderately modernized yet classic appearance.

The interior was also treated to its own all-star list of amenities in the way of Cerullo race seats and headliner and package tray wrapped in supple black leather by Joe's Upholstery. Del Ray Restomod was soon called in to install a custom stereo system and console, as well as new interior lighting to increase the appeal of nighttime driving.

"I would like to thank Juan at RDZ Motorsports, Barry's Speed Shop, Westech Performance, and Raymond at Del Ray for helping me get the car dialed in," John says. "People love every part of the car, and I like hearing all the compliments about its craftsmanship. A special thanks goes to my friend Solorzano who was always there to keep me informed and focused on the end goal—when I would finally get to drive and enjoy my dream car." ACP

SS
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TECH ✓

OWNER: John De La Luz
VEHICLE: 1969 Chevrolet Camaro SS

Engine

TYPE: 2021 Chevrolet Performance LS7
DISPLACEMENT: 427 ci
CYLINDER HEADS: GM LS7 CNC-ported
CAMSHAFT: GM hydraulic
INDUCTION: MSD Atomic AirForce intake manifold
ASSEMBLY: RDZ Motorsports tuned by Westech Performance Group
EXHAUST: Custom 3-inch stainless steel exhaust, MagnaFlow mufflers
DRESS-UP: Eddie Motorsports accessory drive system, Eddie Motorsports hood hinges, Motion Raceworks valve covers
FUEL TANK: Rick's Hot Rods steel 16-gallon tank, VaporWorx controller

Drivetrain

TRANSMISSION: Chevrolet 4L75E four-speed automatic
DRIVESHAFT: Inland Empire 3.5-inch steel
REAR AXLE: Fabricated 9-inch

Chassis

CHASSIS: Total Cost Involved
FRONT SUSPENSION: TCI IFS spindles, upper and lower control arms, rack-and-pinion steering, and 1-inch antiroll bar; Ridetech springs and shocks
REAR SUSPENSION: TCI Torque Arm system, ¾-inch antiroll bar, 1¼-inch Panhard bar, Ridetech coilovers
BRAKES: Wilwood 13-inch rotors, six-piston calipers, $1^{1}/_{8}$-inch master cylinder, CPP HydraStop brake assist

Wheels & Tires

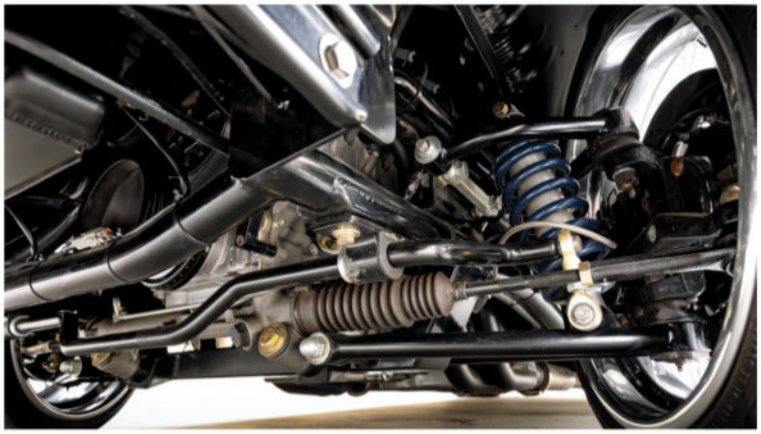
WHEELS: 18x11 and 18x12 Schott Drift wheels
TIRES: 295/30R18 and 335/30R18 Continental ExtremeContact Sport^{Plus} tires

Interior

UPHOLSTERY: Black leather by Joe's Upholstery (Bellflower, CA)
SEATS: Cerullo XR Sport Seats
STEERING: Ididit tilt column, MOMO steering wheel
INSTRUMENTATION: Auto Meter Phantom 11 gauges
SHIFTER: B&M

Exterior

BODYWORK & PAINT: Barry's Speed Shop (Corona, CA)
HOOD: 2-inch cowl hood
GRILLE: RS



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PART 1: WHAT YOU NEED TO KNOW ABOUT COOLING SYSTEM COMPONENTS

BY **RON CERIDONO**
IMAGES BY **THE AUTHOR**
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There's nothing cooler than taking your hot rod out for a cruise. On the other hand, there's nothing worse than driving a hot rod with one eye on the road and the other on the temperature gauge as it climbs up the scale. That's because overheating an engine always comes with consequences—it may be as simple as having to clean up the mess from dumping coolant out the overflow to substantial engine damage. Severe overheating can cause pistons to expand enough to scuff or even seize in the cylinders, rings can lose tension, stick, or literally weld bits of themselves to the cylinder walls, exhaust valves may stick in their guides, heads can warp, head gaskets can develop compression and water leaks, and blocks and heads can crack. In short, a good engine can become an even better boat anchor if it gets too hot. But thanks to a number of experts on the subject, we're going to help you keep your hot rod cool.

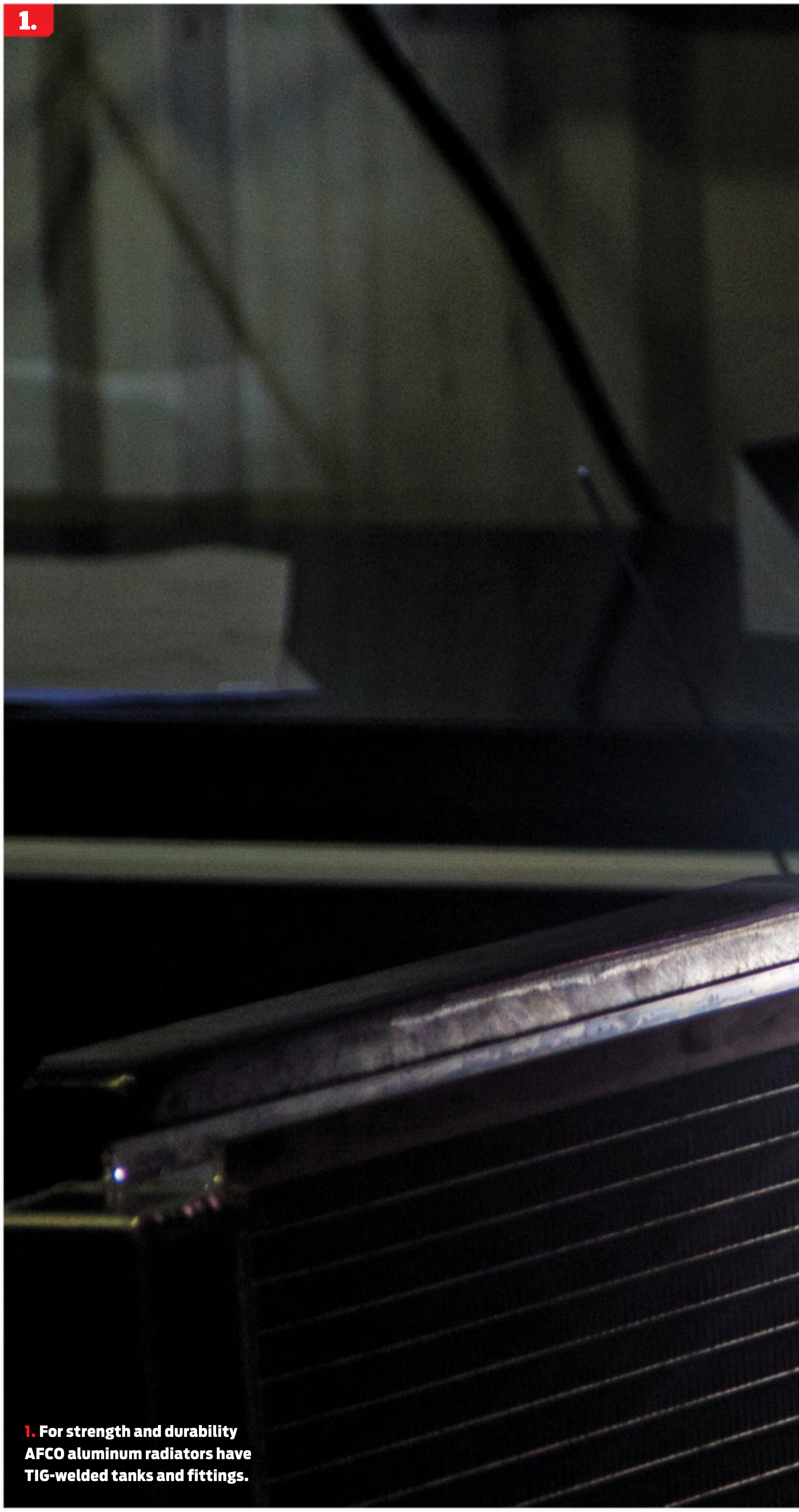
HOW HOT IS TOO HOT?

It's a lousy pun but engine operating temperature really is a hot topic. Although the hotter an engine runs the more efficient it becomes, there is a practical limit, primarily because the internal components can only tolerate so much heat. Due to the composition of today's fuels, 180 degrees is considered the minimum operating temperature for efficient combustion even for vintage engines on the street. Most experts agree that 190 degrees is a safe operating temperature for modern engines and for contemporary fuel-injected crate engines, 195 to 220 degrees is considered the norm.

RADIATOR TYPES

All radiators share the same basic parts, a pair of tanks, a core that consists of tubes that connect the tanks, and the fins between the tubes. For years downflow radiators were used, as they had the tanks at the top and bottom of the cores with vertical tubes connecting them; these radiators were taller than they were wide. As automotive styling dictated lower hood profiles, less height was available for a radiator, which led to the introduction of the crossflow design that is wider than it is tall. By placing the tanks on the sides of the radiator the horizontal tubes could be long enough to provide adequate cooling. All things being equal (tube length and fin count) downflow and crossflow, radiators are the same in their ability to cool.

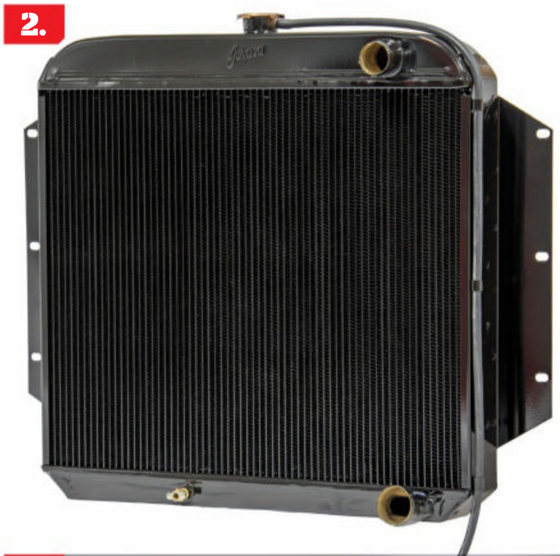
1.



1. For strength and durability AFCO aluminum radiators have TIG-welded tanks and fittings.

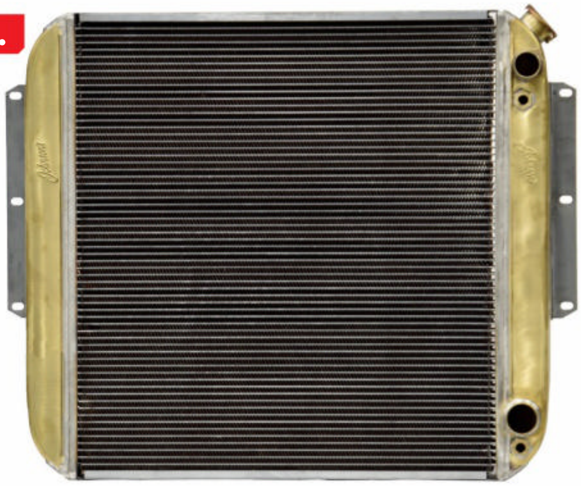
KEEPING YOUR HOTROD COOL

2.



2. Johnson's Radiator Works (formerly Walker Radiator) uses copper brass construction with four-row cores exclusively. This example is a downflow for a 1959-63 Chevrolet.

3.

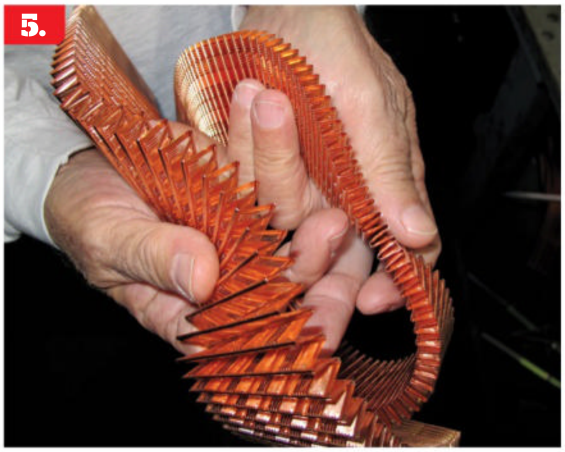


3. This crossflow copper/brass radiator from Johnson's for 1959-63 Chevrolets provides clearance for aftermarket power steering. Crossflow radiators for LS engines have the hoses on the same side and a steam port below the upper hose connection.

4.

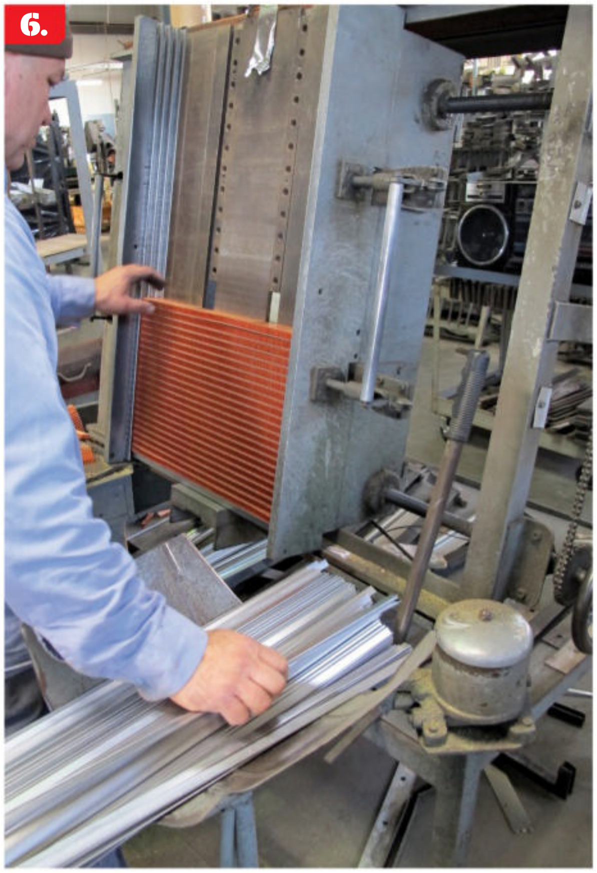
4. Johnson's makes everything in-house, including the tubes and louvered fins for the cores. To minimize the effect of the solder and maximize efficiency of the core, fin-to-tube solder thickness is held to 0.0006 inch.

5.



5. The fins for a copper core radiators have small louvers that create turbulence in the airflow; as a result louvered fins dissipate heat more effectively than smooth fins.

6.

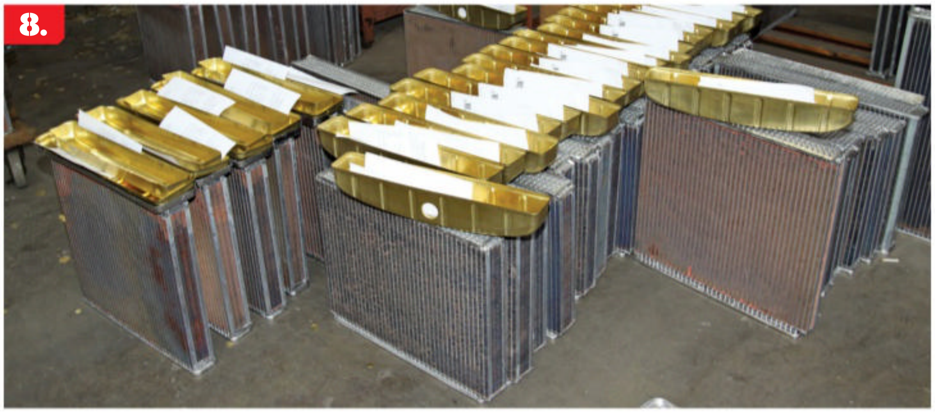


6. Copper cores are assembled alternating rows of louvers with tubes that are covered with a thin coat of solder.

7.

7. With the headers attached to the tubes, the core is put through an oven that melts the solder on the tubes.

8.



8. This is why they're called copper/brass radiators; these copper cores will have the brass tanks soldered in place.

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A relatively new development in radiator technology is the multi-pass configuration. By placing baffles in the tanks, the core is "divided" and coolant is redirected to make two, or in some cases three, passes through the core. Double-pass radiators are often used for LS swaps, so both the inlet and outlet can be on the same side of the radiator.

THE ALUMINUM VS. COPPER/BRASS DEBATE

There has been considerable discussion concerning the effectiveness of copper/brass radiators (copper is used for the fins and brass is used for the tanks) and aluminum radiators. When comparing the thermal conductivity of the two materials (measured in [BTU/hr.ft degrees F], copper is rated at 231, aluminum 136, which means copper conducts heat better than aluminum. That being said, there is an equalizing factor; the lead solder used to attach the copper fins to the tubes is a very poor conductor of heat, so some efficiency of a copper core is lost. Aluminum radiator cores have the tubes brazed to the tubes with aluminum so there is no impediment to heat transfer.

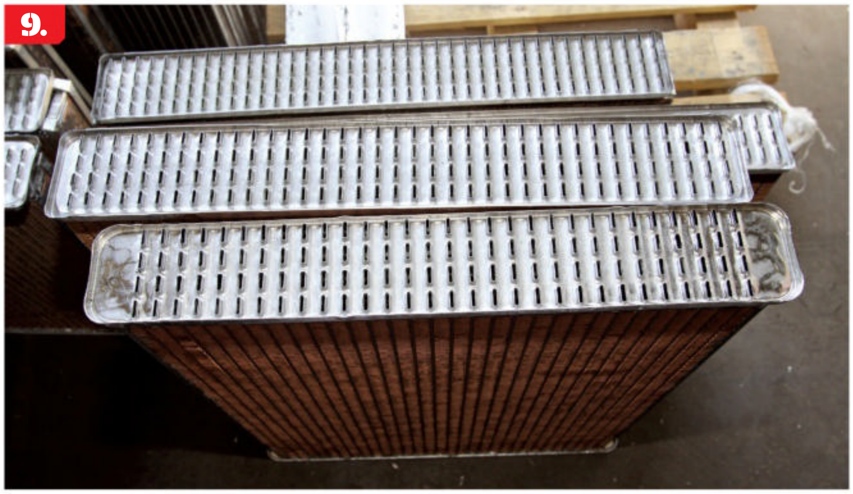
Basically, the situation is this: the advantage of a copper core is offset by the solder that holds everything together, so manufacturers try to minimize its impact by carefully controlling the amount applied. On the other hand, aluminum radiator manufacturers use larger tubes that result in fewer gaps between the fins to increase the efficiency of aluminum cores. We've used both with excellent results, so the choice most often comes down to personal preference, appearance, and price point.

TUBE SIZE & FIN COUNT

While all radiator cores appear to be similar in design, the size of the tubes and the number of fins per inch varies. Modern copper/brass radiators usually have ½-inch tubes, while aluminum radiators use 1-, 1¼-, or 1½-inch tubes. Copper/brass radiators typically have three or four rows of tubes, while aluminum radiators typically have two.

Another important factor that figures in radiator efficiency is the number of fins per inch count. A higher fin count will increase the ability of a radiator to cool, but only up to a point. If the fin spacing is too close, airflow may be restricted, which will reduce cooling capacity. For all-around driving, 14 to 16 fins per is commonly used.

9.

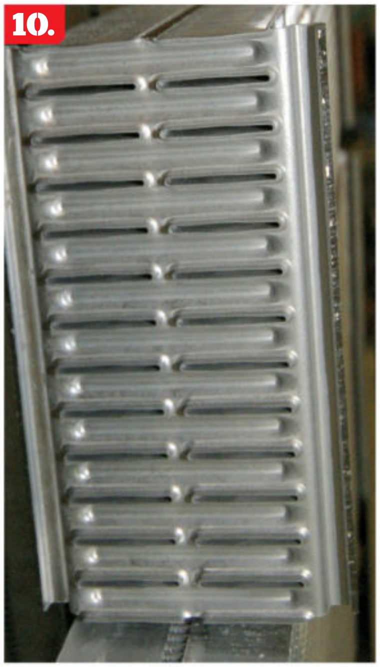


9. DeWitts builds copper/brass and aluminum radiators. This is the header of a copper/brass radiator; note the size of the four rows of tubes.

10. By comparison, this is the header of an aluminum radiator with two rows of 1-inch tubes.

11. DeWitts aluminum radiator cores are brazed in a furnace to join the tubes, fin, and headers. This brazing process is commonly referred to as CAB (Controlled Atmosphere Brazing).

10.



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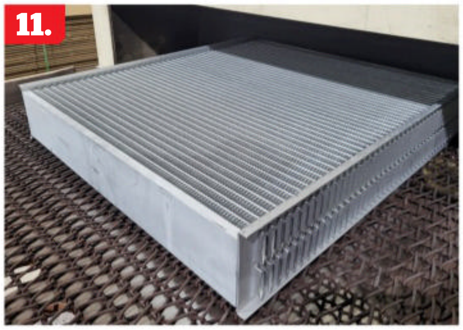

12. DeWitts Direct-Fit Pro-Series Aluminum Radiators fit like the original while providing a 25 percent increase in cooling performance. This example is for 1968-72 Chevelles.

12.

13.

13. DeWitts Direct Fit Pro Series radiators for 1955-57 Chevys have two rows of 1-inch tubes. The HP series has two rows of 1.25-inch tubes.

14. DeWitts offers Harrison stacked-plate-style restoration radiators for C2 Corvettes. They are available with the original GM PN 3155316, specific date codes, correct-appearing inspection stamp, and a reproduction maintenance decal. A "non-detailed" model in natural aluminum is also available.

14.

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LS STEAM PORTS

LS engine swaps are certainly popular, but there is a cooling system issue that must be addressed. Unlike the venerable small-block Chevy that had the thermostat high up in the intake manifold, the LS thermostat is in the water pump housing, which is located low on the engine. As a result, air can get trapped in the system, which disrupts the flow of coolant, which in turn can cause overheating. To cure the problem, GM provided ports that connect to the radiator allowing the air to escape. As LS swaps are so popular, most radiator manufacturers offer radiators with steam connections for the same purpose.

CHOOSING A RADIATOR

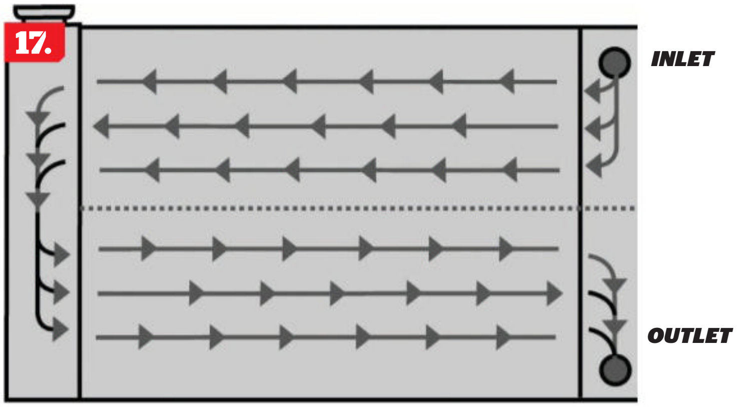
There are a number of considerations to be made when choosing a radiator. For restorations, exact replacements are available, which in most cases are an improvement over the OEM design. For restomods, radiators that look like the original but have additional cooling capacity are also available. For high-performance applications the basic rule of thumb is this: get the biggest, most efficient radiator you can fit in the space available as you'll never regret having more cooling capacity than necessary.

15.

HARRISON
3155416
FILL ½ WHEN COLD
62C

16.

17.

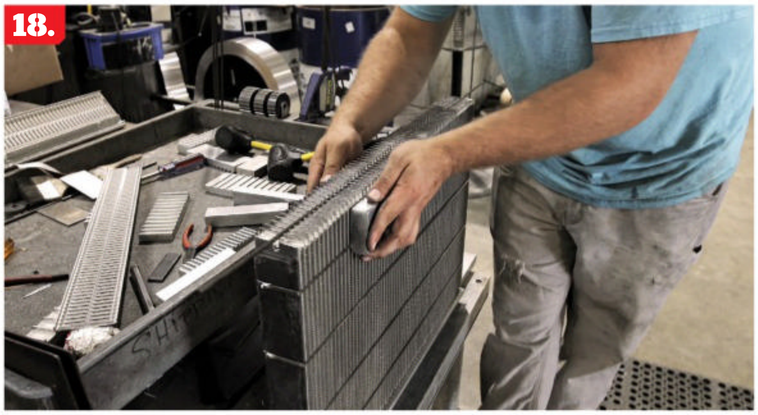


15. DeWitts can also provide reproduction Corvette surge tanks that are made from the original tooling. They have the correct Harrison part number and can have the car's date code added.

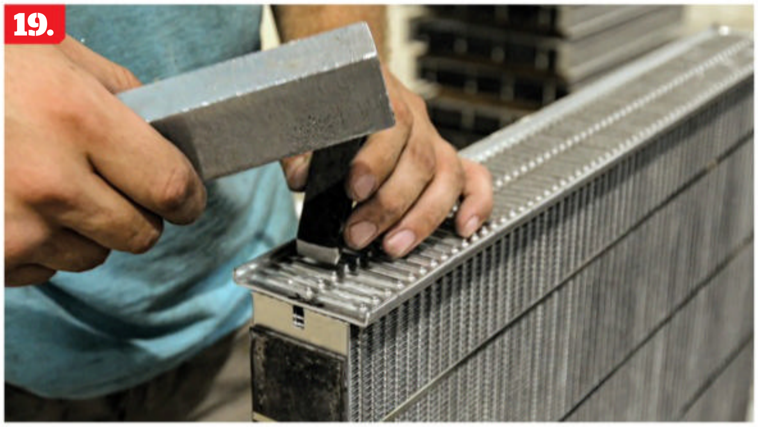
16. This is a U.S. aluminum radiator core being assembled. Modern high-efficiency copper cores have tubes on $^{3}/_{8}$ centers 14 to 16 fins per inch

17. This diagram from AFCO shows how coolant flows through a double-pass radiator. A triple-pass radiator provides one more path through the core.

18.



19.



18. As U.S Radiator explains it, a standard aluminum core uses 1-inch tubes, while a copper core uses ½-inch tubes. So, a two-row aluminum core is equivalent to a four-row copper brass.

19. Here the header is being installed on the core. Aluminum tubes are stronger so they can be bigger than the ½-inch tube used in copper/brass radiators.

20. The tanks on U.S. aluminum radiators are TIG welding with no epoxy sealer.

20.

21.

22.

23.

21. This is a copper/brass U.S. Radiator. Most are available with standard cores (½-inch tubes on $^{9}/_{16}$-inch centers) high-efficiency cores (½-inch tubes on $^{3}/_{8}$-inch centers), multiple-pass cores, or Optima cores (½-inch tubes on $^{5}/_{16}$-inch centers).

22. Aluminum U.S Radiators crossflow radiators are available with high efficiency or high-efficiency triple pass cores.

23. Speedway Motors offers a variety of aluminum radiators. The inlet and outlet on the same side indicates this is a double-pass design.

We've just scratched the surface on the subject of cooling systems, so if we haven't answered all your questions, stick around, there's more to come.

SOURCES

AFCO RACING
(800) 632-2320
afcoracing.com

DEWITTS
(517) 548-0600
dewitts.com

JOHNSON'S RADIATOR WORKS
(256) 399-9925
johnsonsradiatorworks.com

SPEEDWAY MOTORS
(800) 979-0122
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There are car guy shenanigans that most of us can relate to or have done ourselves at one point in time, but the fact that Wayne Long went through eight engines in his 1962 Chevy Impala within a year's time is a number that even the most hardcore car guys can't claim. "I was 18 years old back then and always loved to go fast, so I was either blowing up engines or doing whatever it took to get more horsepower out of the next one. Some things worked and some things… not so much," Wayne laughingly confesses.

Wayne admits to living a wilder lifestyle in his younger years, but today he's a bit older and considers himself a whole lot wiser than he was back in the late 1960s.

These days owning his own contracting business takes up most of his time, so Wayne has resorted to having his cars built by shops that he has the utmost trust in. One of those is Hayman Creations in Uniontown, Pennsylvania—a small, two-man, father-and-son outfit run by Mike and Brad Swaney who have built or worked on about a dozen of Wayne's cars over the years.

Wayne has a tendency to gravitate toward restorations with mild upgrades more so than wild street machines, but this time around he gave the Swaneys creative control on this 1966 Nova as long as they stayed true to the car's original spirit without going too far outside the lines.

BY **NICK LICATA** IMAGES BY **NOTSTOCK PHOTOGRAPHY**

SURPRISE ME!

WAYNE LONG'S 1966 CHEVY NOVA

Uniontown Pa
Hayman
Creations

Brad gives us the lowdown on how Wayne's car came to be: "My dad was in the process of building a 1965 Nova, a car he's had since he was 15 years old. Wayne fell in love with it when we first started doing work for him back in 2012 and would always try to talk my dad into selling it to him even though it wasn't even finished. For years we tried to talk Wayne into going 'all out' on a build instead of just the restored or mild restomod cars we had done for him in the past. Finally, we were able to talk him into it even though he didn't know exactly what he wanted. He initially said he'd like the car to be red with a lot of chrome, and we basically said 'no' to both those ideas and instead got him to buy in on going with some variation of blue. He agreed as long as we kept the Nova looking like a Nova, and to make it competitive enough on the car show circuit to make the Steel City Six at the Pittsburgh World of Wheels. Done deal!

"To make things even more interesting, we told him we would build the car our way and if he didn't like the final product, he could have my dad's Nova instead. Another part of the deal we made is that he wasn't allowed to see the car until it was finished. Throughout all the fabrication and bodywork and paint process Wayne had only seen the engine once it was finished. Needless to say, Wayne was floored when he saw the completed project, so my dad got to keep his Nova and Wayne got a killer hot rod that he's very proud of.

The Swaneys had a great start as the Nova was a rust-free example that made it easy to dig right into the bodywork, fabrication, and paint process. Body mods include body fasteners with over 400 hammer fab "crater makers" incorporated throughout the car, custom front valance, modified stock grille, custom rocker panels and ground effects, bellypans, rear fuel tank cover/diffuser, grille filler panel, and deleted cowl vents. From there they laid down a brilliant coat of Axalta Pacific Blue pigment, giving the Nova a dark deep vibe. The front and rear bumpers were tucked for a modern aesthetic while the BBT Fabrications side mirrors contribute to the Nova's streamlined look.

The car is powered by a 454ci big-block built as a Super Stock race engine Wayne purchased quite a while back. Since then the engine builder has died, so the specs are not known, but the Swaneys dressed it up in Billet Specialties valve covers, Billet Specialties accessory drive system, and a Borla Eight Stack injection system. The mill is managed by a Holley Terminator X and TCI headers expel waste through a 2.5-inch stainless exhaust system topped with Summit Racing mufflers.

A TCI Automotive–prepared 700-R4 transmission is backed by a 9-inch Ford rearend stuffed with 3.50 Currie gears, Truetrac posi unit, and Currie 31-spline axles. A TCI Outlaw shifter was employed to coordinate aggressive gear changes.

A TCI (Total Cost Involved) Engineering Pro Touring front subframe coupled with TCI control arms and spindles matched with Ridetech coilover shocks and 500-pound springs bring the Nova's suspension to the modern era. Out back, the TCI treatment continues with their torque arm suspension also dampened by Ridetech coilover shocks.

The braking system consists of Wilwood disc brakes on all four corners along with a Wilwood master cylinder for a smooth and precise braking experience.

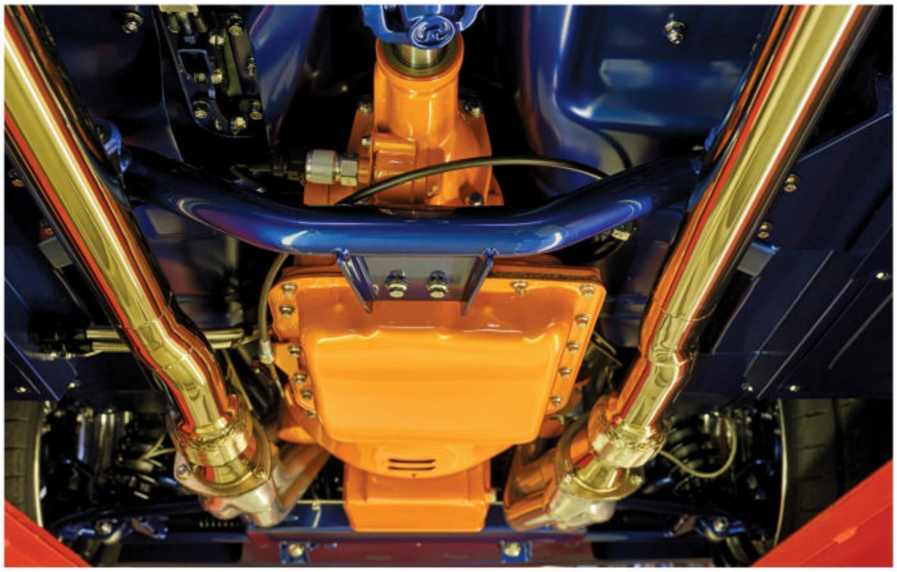
Billet Specialties Hydro wheels with black centers and polished outers give the Nova an updated and aggressive look while not interfering with the car's timeless, vintage style. The Swaneys stitched in a set of mini-tubs to make room for the 11-inch-wide rollers wrapped in fat Yokohama rubber.

Stepping inside the Nova reveals an interior that blends classic styling with modern comfort. The cabin is wrapped in Relicate gray leather upholstery while Relicate German square-weave carpet adds a touch of style underfoot. A few shops took a swipe at the interior, but those failed attempts led to Hayman taking care of the installation, including building handmade interior trim and sill plates painted flat black, a custom center console that seamlessly integrates with the overall design. A pair of Procar by Scat seats provide excellent support, paired with Safe T Boy seatbelts. Steering is smooth and accurate, thanks to an Ididit column and a Billet Specialties steering wheel, while a modified stock dash houses Classic Instruments gauges, delivering accurate engine vitals in a functional layout.

Electrical components are powered by an American Autowire harness, installed by Hayman, while climate control is handled by Vintage Air, ensuring year-round comfort. For entertainment, a JVC head unit and speakers, also installed by Hayman, provides crisp, high-quality sound. Overall, the interior is designed for both performance and comfort, giving Wayne a superb driving experience.

The Swaney duo set out to build Wayne a car that includes an exceptional driving experience coupled with an award-winning appearance—both aspects have been achieved as the car made the World of Wheels Steel City Six at Pittsburgh, the Select Six at Chicago, took top honors at Indy, and most recently the Nova won the 2024 ISCA Street Machine Champion—high accolades, for sure.

At this point Wayne couldn't be happier with the car and how it turned out, and as it stands today he has no intention of swapping out that mysterious Super Stock engine. There's really no reason to mess with perfection … for now. ACP



TECH ✓

OWNER: Wayne Long, Hopwood, Pennsylvania
VEHICLE: 1966 Chevy Nova

Engine

TYPE: Big-block
DISPLACEMENT: 454 ci
CAMSHAFT: Comp Cams hydraulic roller
INDUCTION: Borla Eight Stack
FUEL INJECTION: Borla
CONTROLLER: Holley Terminator X
EXHAUST: TCI headers, 2.5-inch stainless exhaust, Summit Racing mufflers
VALVE COVERS: Billet Specialties
ACCESSORY DRIVE: Billet Specialties
ANCILLARIES: Edelbrock water pump, Proform fans, MSD ignition, MSD plug wires, Eddie Motorsports hood hinges
OUTPUT EST.: 575 hp

Drivetrain

TRANSMISSION: GM 700-R4 by TCI
SHIFTER: TCI Outlawa
DRIVESHAFT: Fayette Welding and Driveline
REAR AXLE: Currie 9-inch, Eaton Truetrac posi, 3.50 gears, Currie 31-spline axles

Chassis

FRONT SUSPENSION: TCI Pro Touring subframe, TCI control arms, TCI spindles, Ridetech coilover shocks, 500-pound springs, TCI sway bar
REAR SUSPENSION: TCI torque arm system, Ridetech coilover shocks, 300-pound springs, TCI Panhard bar
BRAKES: Wilwood 12-inch rotors four-piston calipers, Wilwood master cylinder

Wheels & Tires

WHEELS: Billet Specialties Hydro 18x9 front, 18x11 rear
TIRES: Yokahoma 255/35R18 front, 315/30R18 rear

Interior

UPHOLSTERY: Relicate gray leather
CARPET: Relicate German square weave
INSTALLATION: Hayman Creations (Uniontown, PA)
CENTER CONSOLE: Custom by Hayman Creations
INSULATION: Dynamat
SEATS: Procar by Scat
SEATBELTS: Safe T Boy
STEERING: Ididit column, Billet Specialties steering wheel
DASH: Modified stock
INSTRUMENTATION: Classic Instruments
WIRING: American Autowire by Hayman Creations
HVAC: Vintage Air
STEREO SYSTEM: JVC head unit and speakers
INSTALLATION: Hayman Creations

Exterior

BODYWORK AND PAINT: Hayman Creations (Mike and Brad Swaney)
PAINT: Axalta Pacific Blue
GRILLE: Modified stock
FRONT BUMPER: Modified Stock
REAR BUMPER: Modified Stock
DOOR HANDLES: Eddie Motorsports
HEADLIGHTS: United Pacific
TAILLIGHTS: Eddie Motorsports
SIDE MIRRORS: BBT Fabrications
GLASS: Fesler flush-fit
BODY MODS: Firewall smoothed, custom grille filler panel, custom inner fender panels, removed cowl vents, rocker panel ground effects, rear diffuser, front valance

BY **JEFF SMITH** IMAGES BY **THE AUTHOR**

It's time to change yo

SEE THE LIGHT

AN INEXPENSIVE WAY TO INCREASE HEADLIGHT BRIGHTNESS ON OLDER MUSCLE CARS

If this were a big pharma ad, right now we'd be telling you about a silent killer of early Chevys and try to scare the pajamas off you. But really, this is a somewhat common malady with older Chevy muscle cars that you may not even know is a problem. Driving around under city lights at night, there's plenty of illumination on the boulevards and freeways so that dim headlights aren't a major issue. But take a cruise across the western desert or in the Midwest on a moonless night and you'll soon discover that anything over 50 mph becomes an issue with outdriving your headlights.

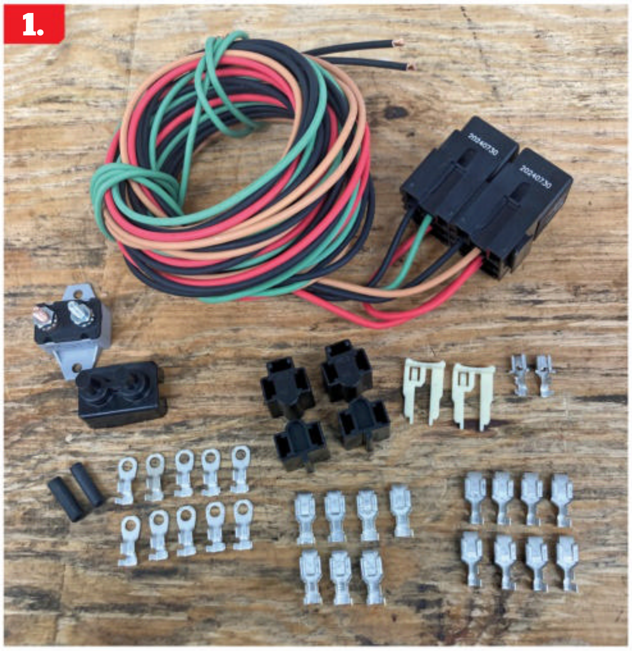
The modern solution has been to upgrade to LED headlights and several companies offer excellent bulbs that project a piercing bright light like a brand-new Lexus. The only problem for guys like us with a four-headlight Chevelle or El Camino is that it will require an investment of over $400 to cover new LED headlights. Thankfully, there's another solution.

We decided to upgrade our headlights with a simple American Autowire kit that will use a pair of relays to put maximum voltage into the headlights, which will bypass the voltage drop through the headlight switch. The headlight switch then becomes merely the trigger to complete the circuit through the new relays.

The original headlight circuit designed by GM perhaps as far back as the 1950s that continued through multiple decades was to route electrical power from the battery through a bus bar in the horn relay up into the fuse box where it split off into several locations, including the headlight switch. Once the headlights are switched on, the power is forced to travel from the switch through the floor-mounted dimmer and then back through the firewall and finally out to the headlights.

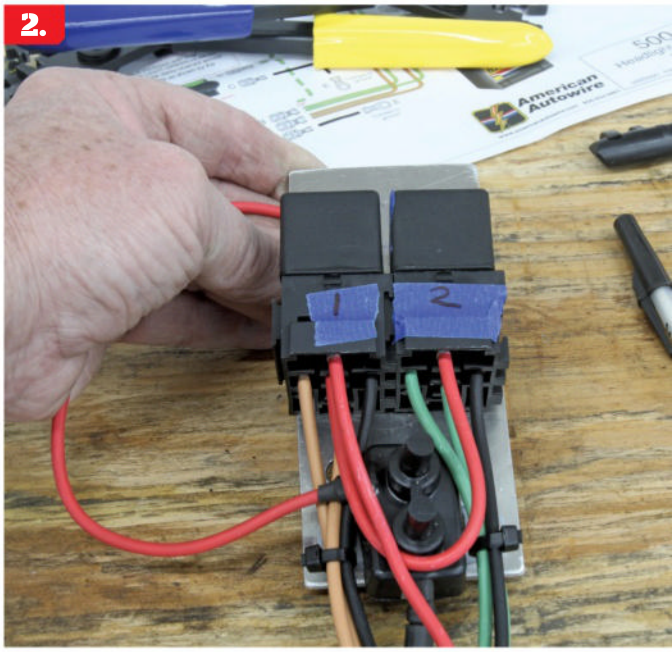
The problem with this rather circuitous route is that it is very inefficient, creating a significant loss of voltage along the way. As a test, we checked voltage at the battery on our 1965 El Camino with a voltage of 12.6 V (engine off). Then we measured the voltage at the driver side outboard headlight and generated a reading of 11.2 V, which means the headlights lost over 10 percent of the voltage following this tortuous path.

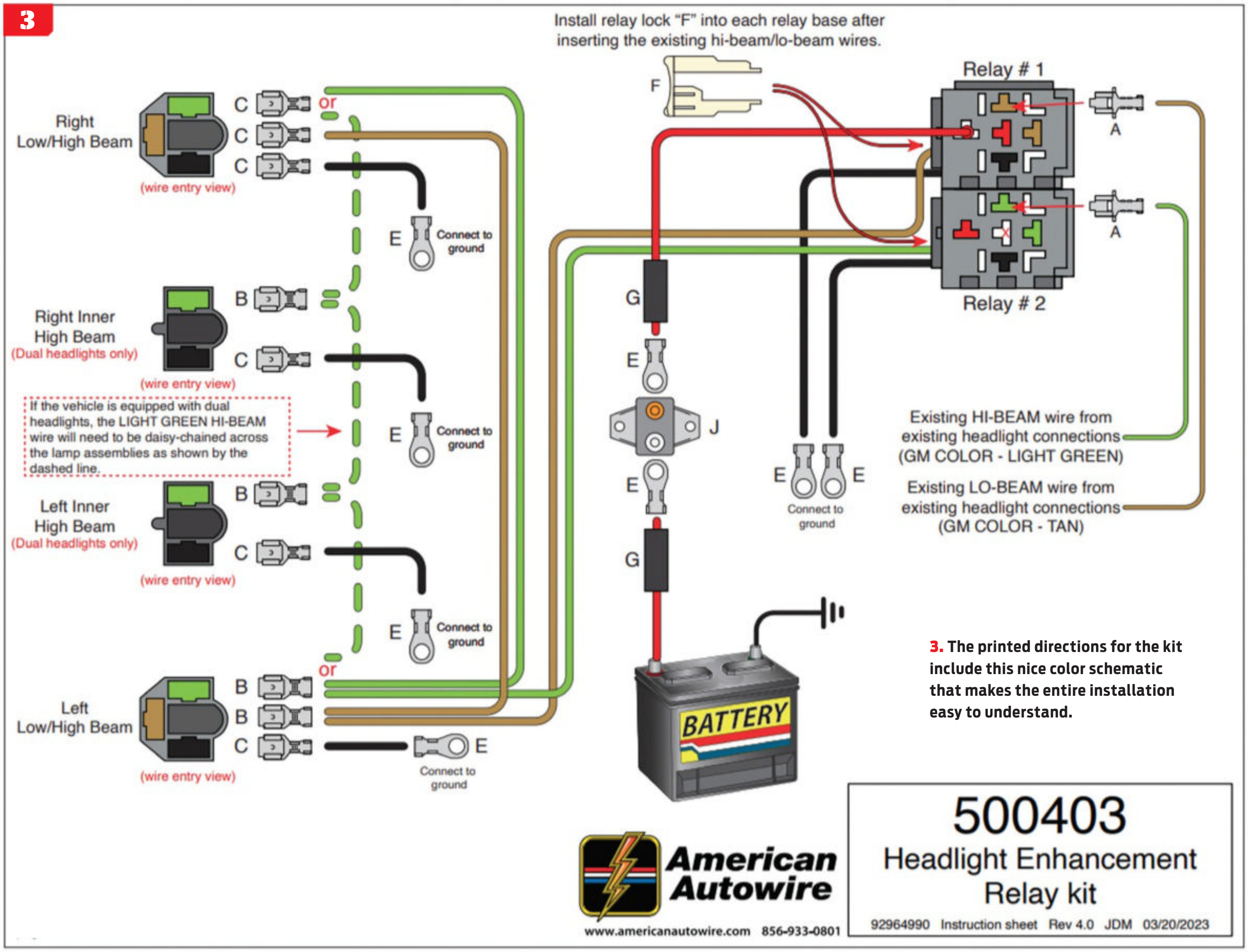
We also decided to improve the brightness of the taillights on our El Camino since more than one fellow hot rodder has suggested that our taillights emit about as much light as a pair of tiny birthday cake candles behind our taillight lenses.



1. The American Autowire relay kit uses a pair of Bosch-style relays to supply system voltage to the headlights, which will significantly increase their brightness. The kit also supplies new headlight plastic connectors, all the necessary crimp connectors, plus a circuit breaker for the power lead from the battery. This protects the headlights in case of an accidental ground that would overload the circuit.

2. We made a mount using a length of aluminum plate to mount the two relays as well as the circuit breaker. We mounted this package on the driver side of the radiator core support using existing holes in the support. We pulled power for the relays from the horn relay, which is connected directly to the battery.





Install relay lock "F" into each relay base after inserting the existing hi-beam/lo-beam wires.

If the vehicle is equipped with dual headlights, the LIGHT GREEN HI-BEAM wire will need to be daisy-chained across the lamp assemblies as shown by the dashed line.

Existing HI-BEAM wire from existing headlight connections (GM COLOR - LIGHT GREEN)

Existing LO-BEAM wire from existing headlight connections (GM COLOR - TAN)

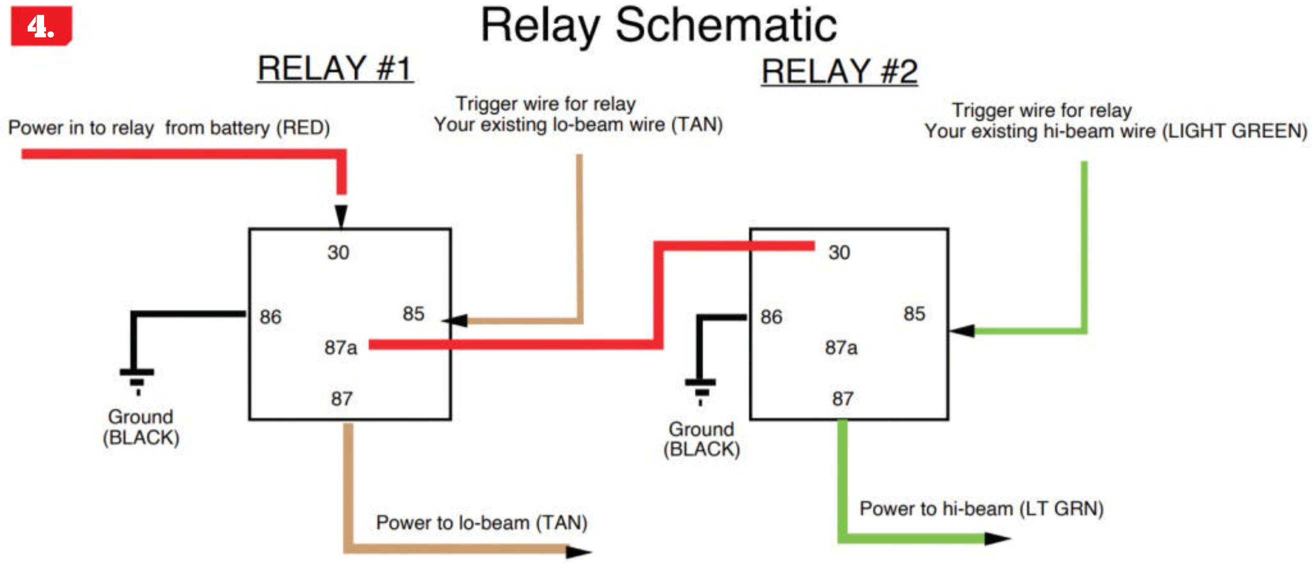
3
Right Low/High Beam
(wire entry view)
C
C
C
or
E
Connect to ground
Right Inner High Beam
(Dual headlights only)
B
C
Left Inner High Beam
(Dual headlights only)
Left Low/High Beam
B
B
C
F
Relay # 1
Relay # 2
A
A
G
J
E
Connect to ground
BATTERY
American Autowire
www.americanautowire.com 856-933-0801
500403
Headlight Enhancement Relay kit
92964990 Instruction sheet Rev 4.0 JDM 03/20/2023

3. The printed directions for the kit include this nice color schematic that makes the entire installation easy to understand.

4. **This is a copy of the relay schematic from the American Autowire instructions. Relay wiring can be confusing, but if you think of the relay connections like a simple intersection or a cross (+) it will make more sense. Power comes from the battery on the 30 terminal and power (load) exits directly across at the 87 terminal. In the opposite direction, the 85 terminal uses a voltage signal (from the headlight switch) to energize the relay that completes this circuit to ground through the 86 terminal.**

5. **This is American Autowire's plug-in 1157 LED replacement bulb on the right with the original incandescent bulb on the left. The LED bulb plugs right into the original socket so it's a very easy swap.**

6. **You can see with the new LED bulb in place on the driver side of the parking lights how much brighter it is compared to the standard incandescent bulb on the passenger side.**



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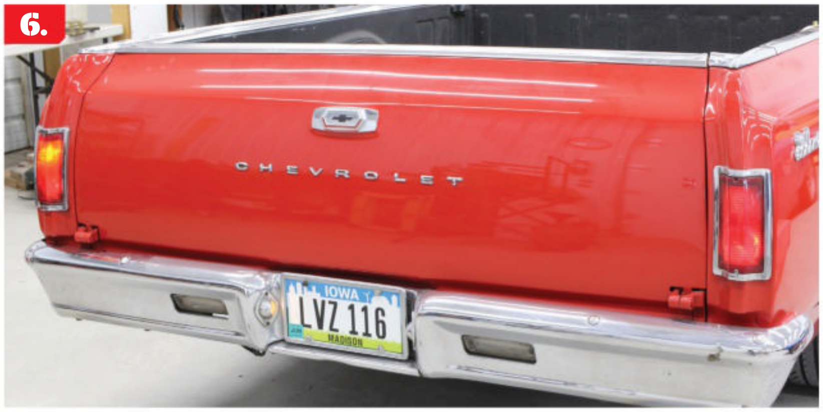

In order to create a more efficient path to enlighten our headlights, we need to understand how electrical relays can help this situation. An electrical relay is a simple device that uses a low amperage signal to complete an electrical connection to a higher amperage device. In our case, we will be using the voltage from the headlight switch to trigger the relay. The advantage of this conversion is that the relays will be located very close to the alternator/battery source. By doing this, the lower voltage signal from the headlight switch is only going to be used to trigger the relay, which will then supply nearly 100 percent system voltage to the headlights.

Because the relay pulls power from the bus bar where full system voltage is present, we can eliminate voltage drop through the headlight and dimmer switches and feed full system voltage to the headlights. This will result in much brighter headlights. It's really a very simple system requiring only a few minor changes to the original headlight circuit.

If you want to get an idea of how much brighter your headlights will be using a set of relays, you could rig up a test wire directly from the battery to the headlights and compare that amount of light intensity to the brightness your headlights are capable of when operated by the original circuit through the headlight switch. This simple test will quickly reveal the benefit of converting to a headlight relay system.

While you could certainly go out and buy a pair of simple Bosch relays and some wire and convert your system, we discovered a complete kit from American Autowire that collects all the components you will need into one part number. The kit comes with a pair of relays for either a two- or four-headlight system as well as the relay connectors and the lengths of wire and additional connectors needed to complete the conversion.

American Autowire also recommended using their single- and double-crimp tools as part of this conversion. The tools are necessary to ensure the proper wiring crimps are made. A better connection ensures that all the voltage supplied by the relays will in fact arrive at the headlights. Plus, the tools produce a professional-style crimp that is not always achievable with budget versions.

The crimping process is important enough that American Autowire has produced an online video explaining exactly how to make the proper crimps for both small wiring connections as well as the double crimps necessary when wiring dual headlights. While the tools are pricey, they are exceptionally well built and will serve you well throughout a lifetime of automotive wiring adventures.

We spent a little extra time building a small aluminum plate to mount the two relays and the circuit breaker that is included in the kit. We attached this mount to the radiator support using existing holes in the support so that we could mount the relays without having to drill more holes. The idea was to minimize the length of the leads from the horn relay to the relays to supply the most amount of voltage to the relays.

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7. With LED taillights and parking lights, the reduced current load from these lights often means the stock turn signal flasher will no longer function properly. The solution is a new solid-state flasher *(right)* to ensure the turn signals work properly.

8. We struggled for awhile after completing the installation because the headlights would not respond for the bright lights. We discovered the dimmer switch was bad. This looks like it might be an original one from 1965! We replaced the switch and now all is right with the world.

8.

9.

10.

9. We tested our existing circuit with a voltmeter to determine the amount of voltage drop in the circuit. With headlights on and the engine not running, we measured only 11.2 V from 12.6 at the battery. This revealed a 1.2V drop between the battery and the headlights. This photo shows voltage to the left front headlight after the relay conversion at 12.17 V, which is nearly 1 V more to the headlights using the American Autowire relay conversion.

10. For comparison, we pulled the El Camino alongside our 1965 Chevelle on the left that uses the stock headlight circuit. Both cars used the same 12.6 V of battery power. It's not dramatically apparent from this photo, but in person the El Camino headlights are significantly brighter.

We then followed American Autowire's color instructions supplied with the kit to wire the relays into the headlight circuit. The existing low-beam wire will be cut off and a new connector will be installed to supply the trigger voltage for the low beams at relay number 1. The same process will be done on the high-beam side for relay number 2. The instruction sheet is very clear on how to go about this, and the kit supplies new headlight and relay connectors so you don't have to deal with decades-old connectors and wiring.

Once we completed all the wiring connections, we tested the circuit, which at first worked fine. Soon after hitting the dimmer switch several times, the switch failed, which required a trip to the auto parts store for a replacement. With that conversion completed, we then tested the voltage at the headlights again. Previously we had recorded only 11.2 V but with the relays in place, the voltage to the headlights jumped to 12.17 V, a significant 0.97V increase.

With the headlights rewired, we then moved to the rear of the car where we used a pair of 1157-style LED bulbs to replace the existing incandescent versions. We also exchanged the front parking light bulbs with LED as well so that all four corners were consistent.

These new LED bulbs require much less energy to create a brighter intensity, but this also means you must replace the original turn signal flasher with a solid-state flasher that is compatible with the LED bulbs. This will allow your turn signal LED bulbs to flash correctly. As a matter of full disclosure, we must also report that the new flasher does not make that familiar clicking sound when the turn signal is working.

With the headlights and LED turn signal and taillight bulbs converted, we waited for nighttime to evaluate our conversion. It was immediately obvious that our headlights are now much brighter. We live in a very rural setting where deer with suicidal tendencies are prevalent on our country roads. Our brighter headlights now give us a much broader and more distant view of the countryside so we can keep those deer at a safe distance from our El Camino. If nothing else, it makes nighttime cruising a much more enjoyable experience.

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These are load estimates of different headlights for a 1966 four-headlight Chevelle. These ratings are for an individual light based on a 12V input. Increasing the voltage input increases the wattage and the amperage draw as well as making the headlights brighter. Four incandescent headlights on a Chevelle would add up to a 12- to 14-amp load compared to 6 to 7 amps on the low beam side.

DESCRIPTION AMPERAGE DRAW

Incandescent headlight	3.0-3.5
Wagner halogen, dim	2.7
Wagner halogen, bright	3.9
LED headlights, low beam	1.5
LED headlights, high beam	2.2

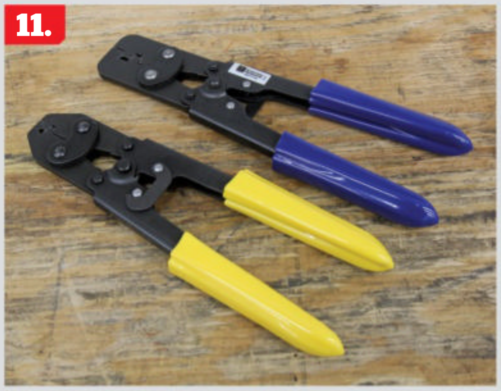
PARTS LIST

DESCRIPTION	PN	SOURCE
Headlight relay harness	500403	American Autowire
LED 1157 bulbs	500571	American Autowire
LED solid state flasher	510226	American Autowire
Single crimper tool	510585	American Autowire
Double crimper tool	510586	American Autowire

HOW TO CRIMP WIRES CORRECTLY

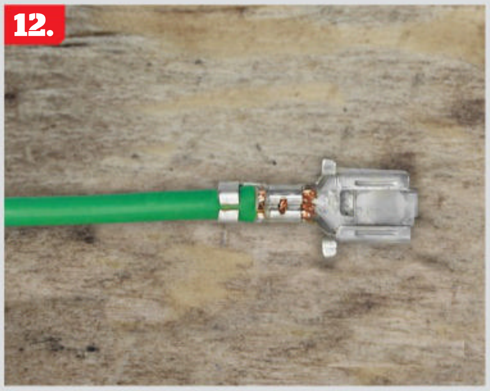
These photos will illustrate making single- and double-wire crimps. A more detailed process is shown on a video that can be found here: https://www.youtube.com/watch?v=JAgEDoVI-co. We suggest watching the video as it offers several details we don't have room to cover here. The double-wire crimper tool is necessary for this application because two wires feeding into a simple connector is how the passenger side low beam and the inboard high beam lights are triggered.

11.



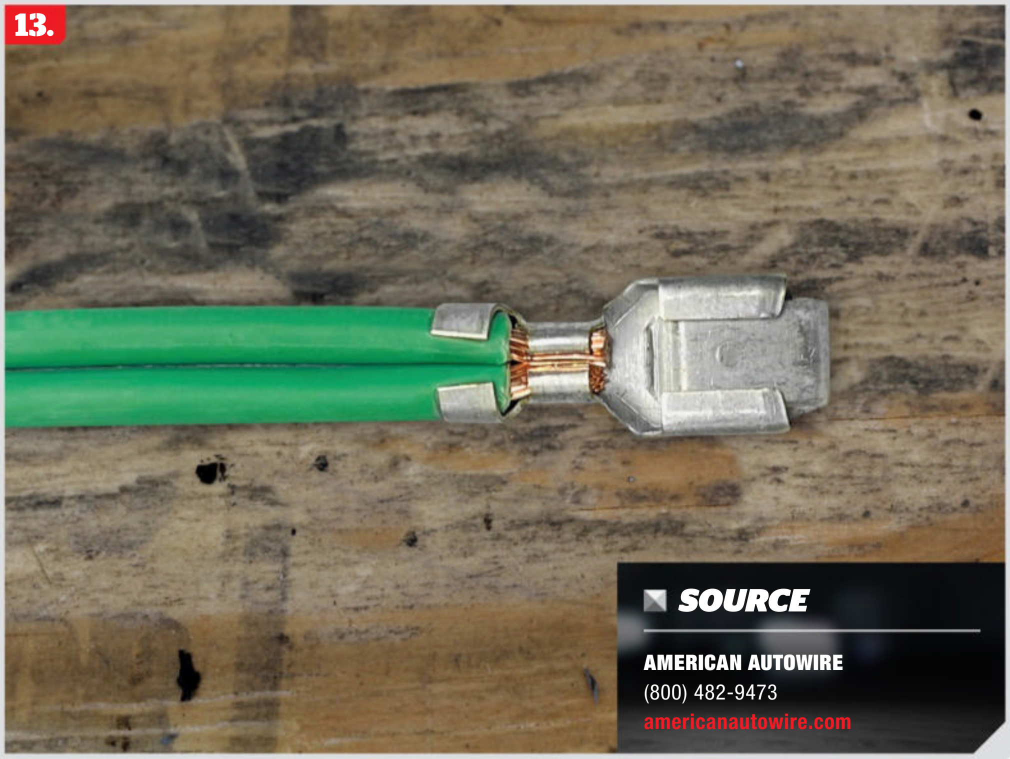
11. These two crimper tools are what you'll need to complete the crimps. The single crimp tool is the one with the yellow handle and can also be identified with its tapered ends. The double crimp tool is the upper one with the blue handles. It has a squared-off end and the crimp portion of the tool is slightly deeper.

12.



12. First, strip the wire to the correct length. If too much copper wire is exposed, this will not leave room for the crimp on the insulation. The correct strip will leave just a slight amount of exposed copper between the crimp on the copper and the crimp on the insulation.

13.



13. A double crimp accommodates two wires coming into the larger connector and requires the specific double-crimp tool to accomplish this connection. The tool offers two separate crimp jaws, one for the actual copper wires and one for the insulation.

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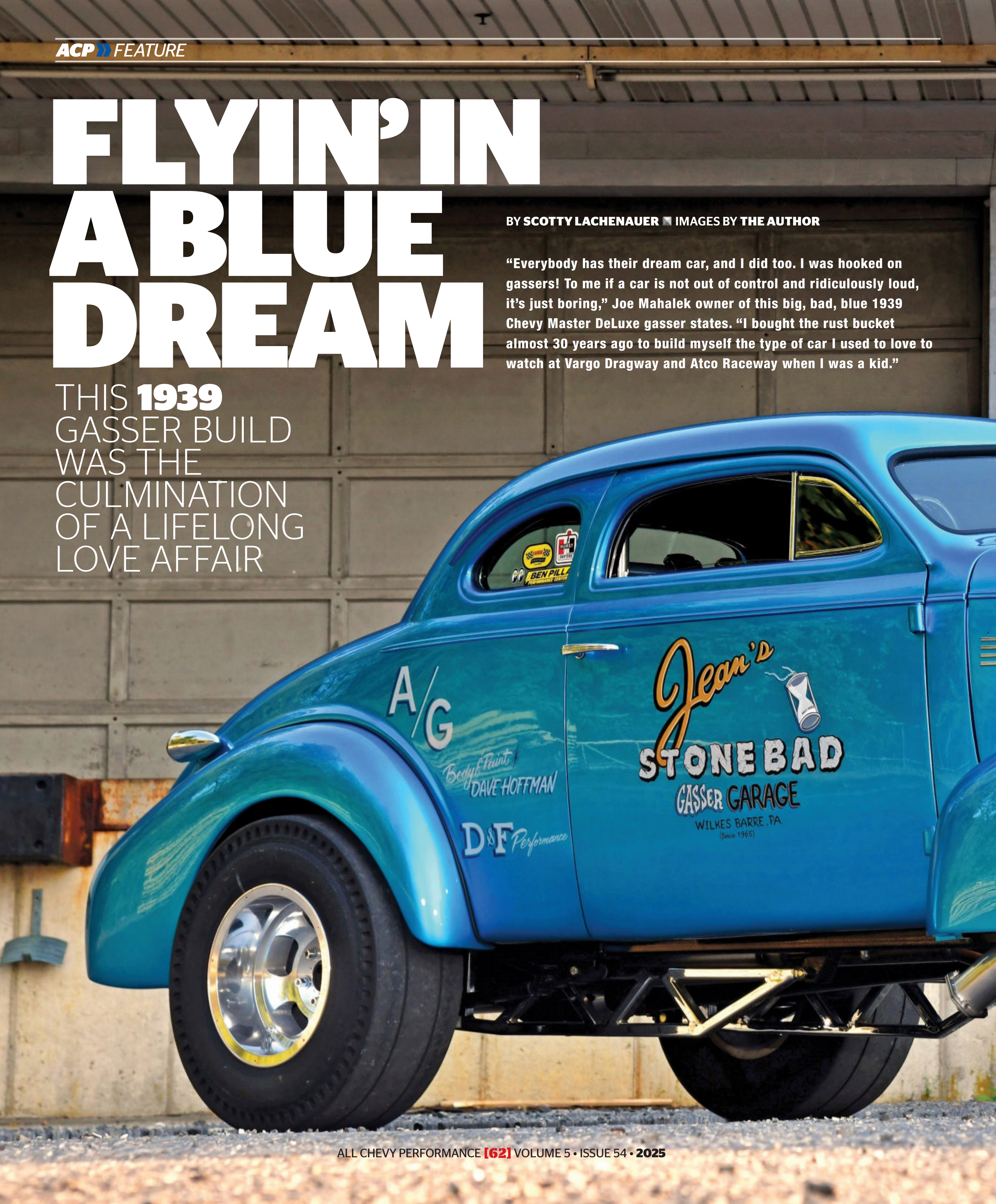
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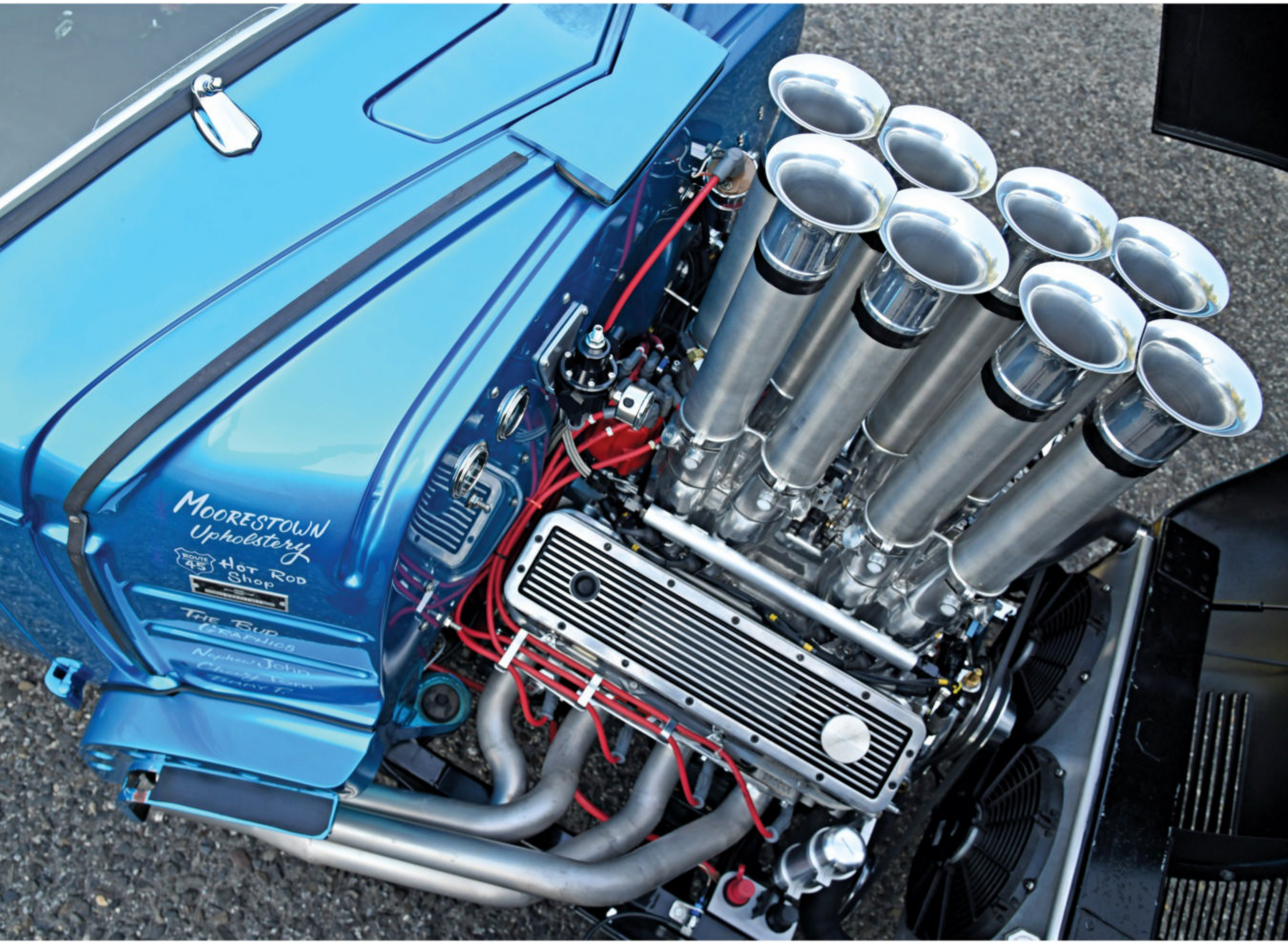
FLYIN' IN A BLUE DREAM

THIS **1939** GASSER BUILD WAS THE CULMINATION OF A LIFELONG LOVE AFFAIR

BY **SCOTTY LACHENAUER** ◼ IMAGES BY **THE AUTHOR**

"Everybody has their dream car, and I did too. I was hooked on gassers! To me if a car is not out of control and ridiculously loud, it's just boring," Joe Mahalek owner of this big, bad, blue 1939 Chevy Master DeLuxe gasser states. "I bought the rust bucket almost 30 years ago to build myself the type of car I used to love to watch at Vargo Dragway and Atco Raceway when I was a kid."

C.I. 468



The carcass that Joe started out with was heavily corroded and nearly beyond help, but that didn't deter the man from making it his starting point. It had no front fenders or hood, and the rear fenders were not salvageable. It also lacked a trunk lid and the floors were pretty much gone. So, with the odds stacked against him, Joe prepared for the rocky road ahead. Not having his own garage at the time, he first stored the car at his brother's house 2½ hours away and would work on the car only on weekends.

"As a machinist, the first thing I did was set out to build a new chassis. Originally, I built the entire chassis out of wood, cutting and changing things as I went along," Joe mentions. "After I had things where I wanted them, I took the measurements and fabricated the chassis out of rectangle tubing on my commercial welding table. Attempting to build the entire car by myself, my brother, Stanley, thought I was nuts."

Over the years, there was always a hunt going on, with Joe and his nephew John Mahalek digging through local junkyards for those elusive parts and pieces Joe needed to complete the Chevy. With the frame built, Joe sought to get the suspension together, first sourcing the parts for the all-important gasser front end. Joe had concerns about the car's handling ability, so he ditched the idea of a straight axle like most gassers used and instead went with a chromed dropped axle and leaf springs from a 1968 Chevy van.

Though his goal was to do a recreation of a 1960s-style gasser, Joe used a mix of vintage and modern parts to pull off his build. A Flaming River power rack was added up front as were QA1 single-adjustable shocks. Wilwood disc brakes were installed at all four corners, pushed by a Speedway Motors electric power brake kit. Joe custom-milled brackets so the front axle would accept the modern Wilwood discs. Out back, Joe built a pair of extra-long chromoly ladder bars. A Ford 9-inch built by Drive Train Specialists is stuffed with 3.73 gears.

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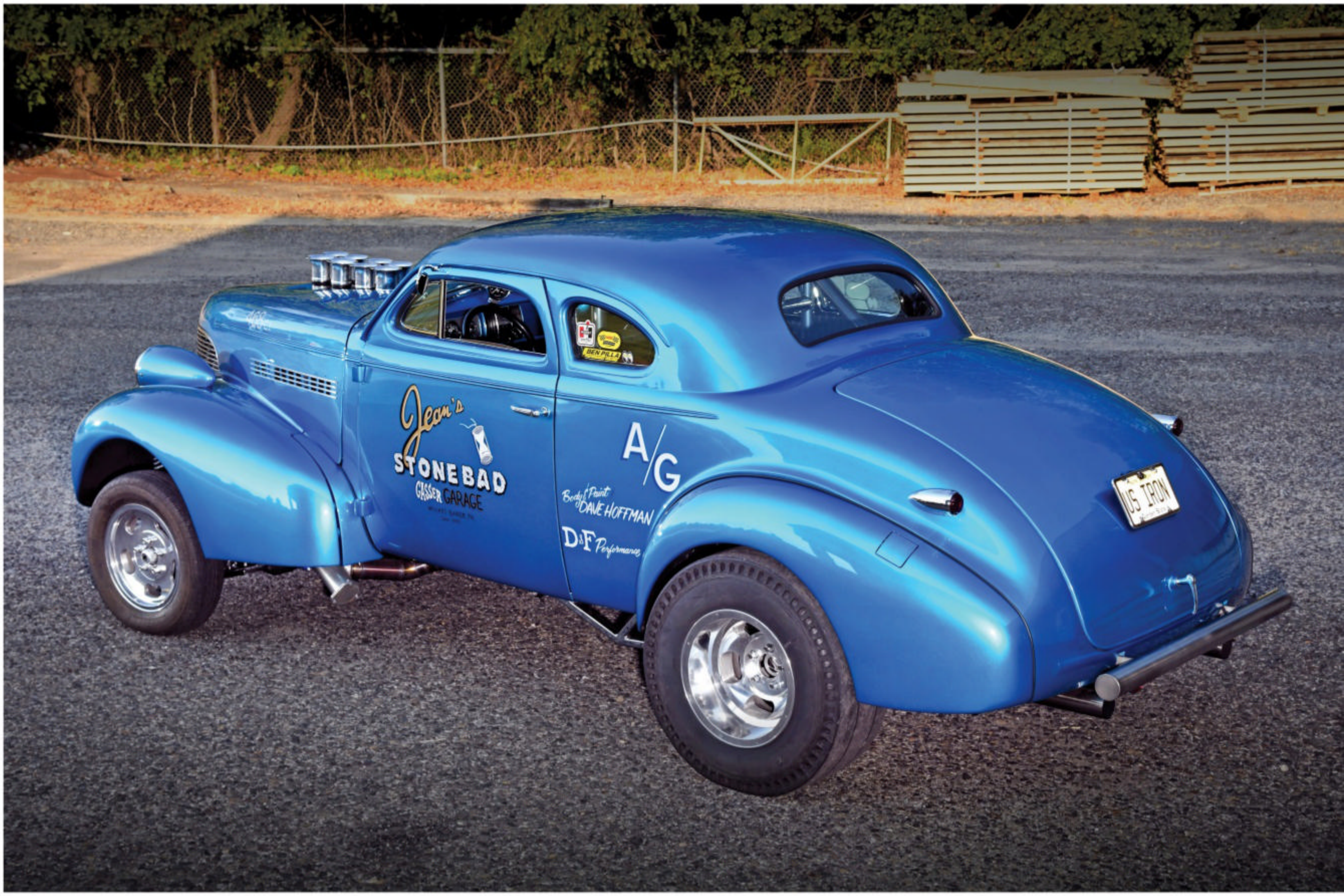
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Joe moved onto the body, which needed extensive work. With the help of some friends, the group finished off all the metal replacement. A 4-inch chop was pulled off perfectly by Joe Sulpy of Phoenix. The final bodywork and paint was completed by Dave Hoffman Body and Paint in Pennsburg, Pennsylvania. “I went with a PPG color called Grandeur Blue, then the door graphics were added by Bud Cunningham at Budd Graphics of Delran, New Jersey,” Joe explains. “All the lettering was pulled off by another friend, Willy, at Willy’s Old School Lettering in Boyertown, Pennsylvania.”

Joe explains the artwork on the car. “The graphics on the door are an homage to the 1960s. Jean is my mother’s name, and although she never got a chance to ride in the Chevy, she now rides with me every day. ‘Stone Bad’ goes back to my buddy Tony, who sadly died in Vietnam, but wrote in my high school yearbook ‘to a cool cat with a stone bad machine;’ 1965 was the year I graduated; and Wilkes Barre is where I started building the car in my brother’s garage.”

The cockpit is all business. Moorestown Upholstery handled the stitching, starting off the interior by redoing a pair of 1966 Corvette bucket seats in classic tuck and roll styling. The instrument panels were custom-made and filled with original Moon gauges and a tachometer. A G-Force five-point belt system was added for extra safety and a handmade rollbar was chromed and added for period perfection. A rearview camera was added out back and hidden out of sight when not needed in the Chevy’s glovebox. A Flaming River steering column is topped with a chromed Summit vintage-designed steering wheel. A set of Tilton pedals finishes off the look Joe was after.

For power, Joe knew he had to hit the proverbial home run. All this big-block Chevy goodness starts out with a 454ci block punched out to 468 ci. An Eagle crank and rods form the rotating assembly along with SRP 11.0:1 pistons, making for some hefty compression. A pair of Brodix heads top the cylinders on this beast. For induction, Joe skipped the typical blower setup and used a Crower intake altered for EFI with handmade fuel rails run by a Motec ECU. He then set up velocity stacks and welded stub ends at 7 degrees at the bottom, rotated to vertical to make it look like an old-school Hilborn setup. Handmade headers running into a Borla 3-inch exhaust handles the spent gases.

An M22 transmission was called into duty to get this ride through the gears. “I know, my Rock Crusher four-speed is not going to hold up for long with the 650 hp and my heavy right foot,” Joe quips. “When it pops, I’ll just drop in another one. There is no compromise here, I got to shift this baby!” Stan Mahalek at Stan’s Trans in Wilkes-Barre, Pennsylvania, handled the tranny work. Scott Hughes at the Route 45 Hot Rod Shop in Swedesboro, New Jersey, installed a complete wiring harness using American Autowire products. A Bosch external fuel pump feeds this monster and pulls from a handmade, baffled 30-gallon tank.

TECH ✓

OWNER: Joe Mahalek, Medford, New Jersey
VEHICLE: 1939 Chevy Master DeLuxe

Engine

TYPE: Big-block Chevy
DISPLACEMENT: 468 ci
BORE: 4.310
STROKE: 4.000
CYLINDER HEADS: Brodix aluminum
ROTATING ASSEMBLY: Eagle Crank and rods, SRP 11.0:1 pistons
CAMSHAFT: Comp Cams roller cam
INDUCTION: Crower intake modified for EFI with Motec ECU
EXHAUST: Handmade headers with a 3-inch Borla exhaust
ASSEMBLY: D&F Performance (Berlin, NJ)
VALVE COVERS: Vintage Edelbrock
DYNO TUNING: Second Street Speed (Perkasie, PA)
OUTPUT: 650 hp

Drivetrain

TRANSMISSION: M22
REAR AXLE: Ford 9-inch rearend, 3.73 gears

Chassis

FRONT SUSPENSION: Chevy van drop axle, leaf springs, QA1 single-adjustable shocks, Flaming River rack-and-pinion
REAR SUSPENSION: 1939 Chevy leaf springs, QA1 single-adjustable shocks, homemade chrome ladder bars
BRAKES: Wilwood discs with Speedway Motors electric brake booster

Wheels & Tires

WHEELS: Original Ansen Sprint, 15x4 front, 15x10 rear
TIRES: Nankang 165/80R15 front, custom radial pie crust tires rear

Interior

UPHOLSTERY: Vinyl
INSTALLATION: Moorestown Upholstery (Moorestown, NJ)
SEATS: 1966 Corvette
STEERING: Flaming River column, Summit steering wheel
SHIFTER: Hurst
DASH: Custom
INSTRUMENTATION: Moon
HVAC: None
ENTERTAINMENT: Loud exhaust
ROLLBAR: Custom chrome

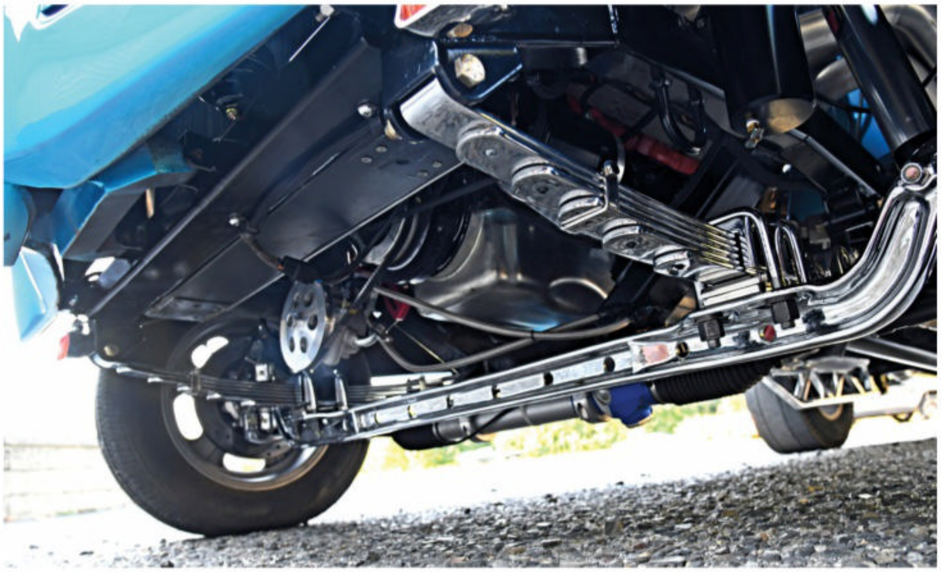
Exterior

BODYWORK AND PAINT: Dave Hoffman Body and Paint (Pennsburg, PA)
PAINT: PPG Grandeur Blue
FRONT BUMPER: None
REAR BUMPER: Custom tube
GRAPHICS: Budd Graphics (Delran, NJ)
LETTERING: Willy's Old School Lettering (Boyertown, PA)

Once completed, Joe was blown away by what he built and described the ride as, "running on rails, and on a hard launch it sounds like a pissed off chain saw!"

Special thanks go to Lou at Ben Pilla Speed Shop in Bellmawr, New Jersey, nephew John Mahalek, Dave Porter, Mike Talpos, Tony Salloum at VAC Motorsports, Timmy Pack, Rich Marshall, Tom Kettell, John Horay (Sparky the Welder), Joe Mazzo Trick Welding, and Tom Maier.

ci 468
468ci



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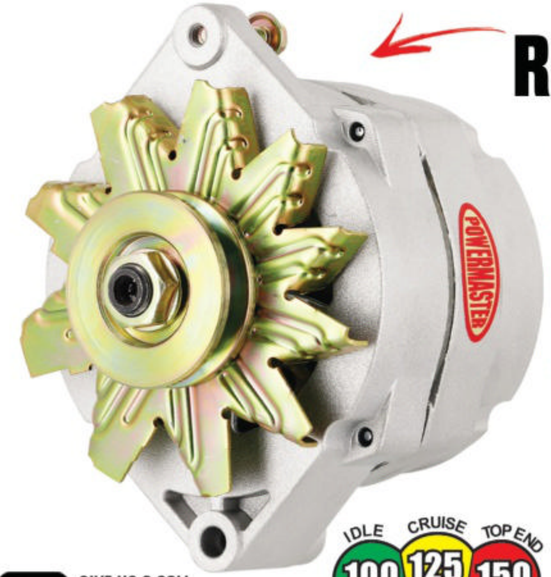

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BY **BARRY KLUCZYK** ◣ IMAGES BY **THE AUTHOR**

SMOOTH STOPPING

Confident stopping power is a must in a high-performance Chevy. In addition to big rotors and multi-piston calipers, the power-assist system helps deliver that feeling of immediate responsiveness.

From the factory, the power braking system on almost all classic Chevy models comes in the form of vacuum assist—a simple and effective method that uses vacuum generated by the engine to multiply the driver's force on the brake pedal. On stock, naturally aspirated engines it is an excellent system and, apart from the occasional failed diaphragm or faulty check valve, it's largely bulletproof.

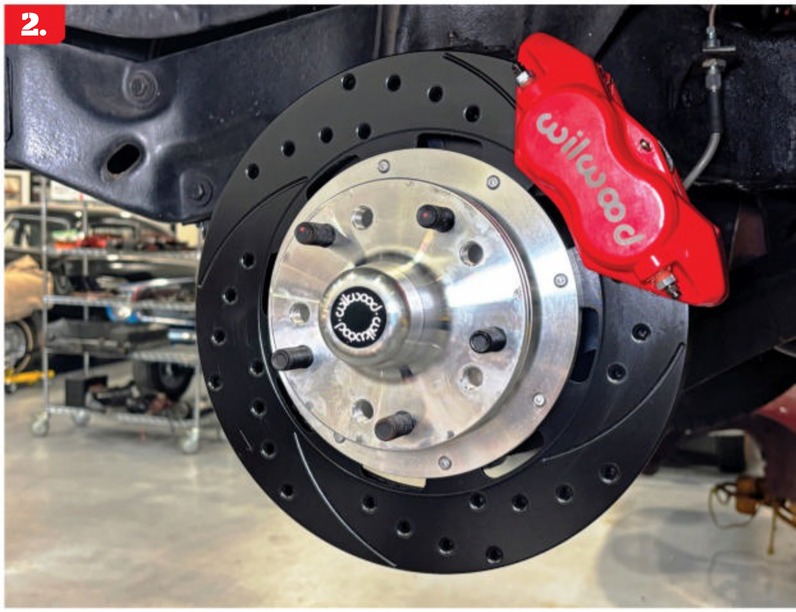
The dynamics change with performance upgrades such as an aggressive camshaft with big duration specifications or a power adder such as a supercharger or turbocharger. They typically reduce or all but eliminate the vacuum necessary for effective power braking assistance. The same goes for diesel engines. Vacuum canisters and even electric vacuum pumps can help, but hydro boost assistance is an increasingly popular choice that eliminates vacuum altogether and instead relies on the power steering system to pressurize the brakes. As with vacuum-assist, hydro boost is not a new technology and has been used for years mostly in heavy-duty truck applications. In performance cars it offers a couple of significant advantages, including increased braking power and improved braking feel.

Because the hydraulic pressure generated by the power steering pump is much more powerful than the engine-generated vacuum—between 800 and 1,400 psi—the hydro boost system typically delivers much greater braking force. That translates into a much more consistent and responsive pedal feel that is also generally more precise and can be modulated more effectively. A hydro boost system also does not put a load on the engine, as does a vacuum-based system. That can provide a marginal boost in performance and efficiency.

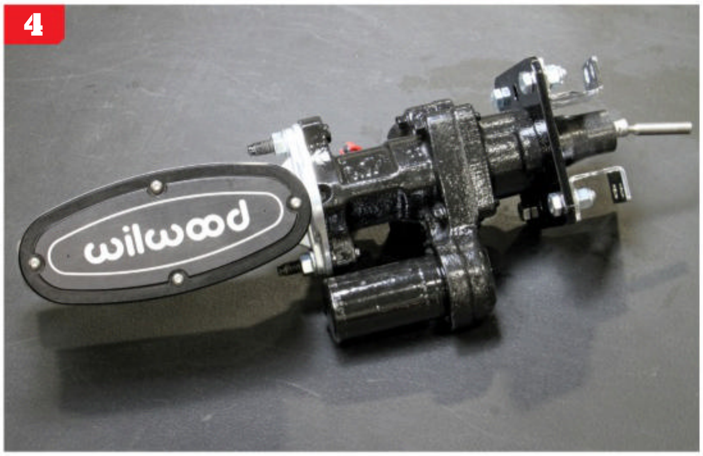
1.
'72 CHEVELLE

1. The project car for the hydro boost installation is a 1972 Chevelle convertible with a 383 stroker small-block underhood and an automatic transmission paired with it.

2. Among its recent upgrades was a conversion to Wilwood front and rear disc brakes with four-piston calipers and 11-inch drilled-and-slotted rotors.



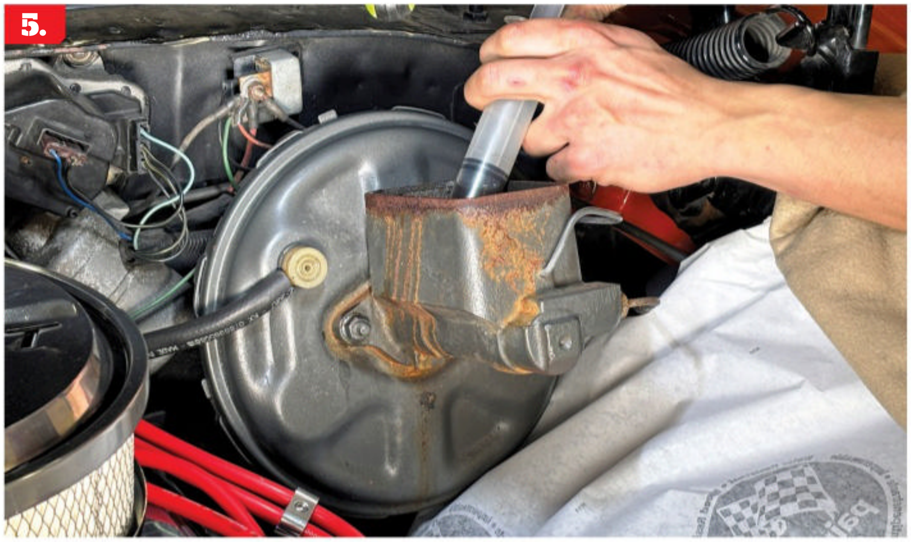
3.
CHEVROLET
CHEVROLET



3. The new brakes would have worked with the existing power-assist system, but it was the low vacuum production of the 383's big camshaft that prompted the change. It was already an issue prior to the brakes' installation and adding them was the perfect time to swap out the vacuum-boost system.

4. The two basic components of the upgrade in this project include the hydro boost system and a Wilwood tandem master cylinder. The booster works only with master cylinders featuring a bore larger than 1 inch. Wilwood offers them with 1- and $1^{1}/_{8}$-inch bores, so the larger version was used. Not shown is a separate hydraulic hose kit with fittings that link the power steering pump with the booster.

5. Before the new booster is installed, the existing one needs to be removed, and that starts with draining as much brake fluid from the master cylinder as possible. A big syringe is really helpful but care must be taken to prevent fluid from dripping onto painted surfaces in the engine compartment. It will damage them. That's why there's lots of paper laid beneath the master cylinder here.



6.

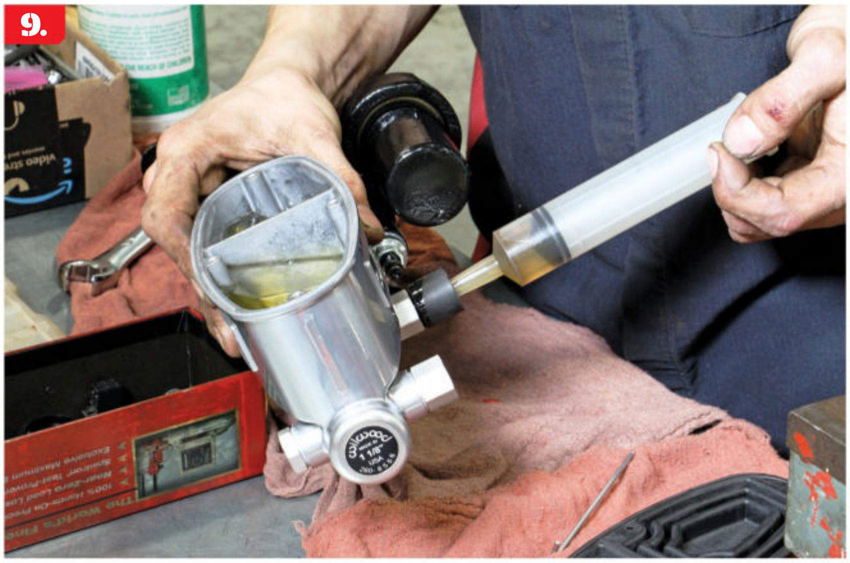
6. The brake lines are also disconnected from the master cylinder. In most cases, they will not line up with the ports on the replacement booster.

7. There's also a quick slide inside the car to disconnect the master cylinder's pushrod from the brake pedal. The master cylinder won't let go without doing this.

7.

8.

9.



8. Because the booster and master cylinder are replaced in this project, they can be removed as a single unit. The fasteners holding the booster to the firewall are typically difficult to reach, but once they're loosened the booster pops off pretty easily.

9. In preparation for installation, the new master cylinder must be bench-bled. There are a couple of ways to do it, but the syringe method works as well here as removing the fluid from the old master cylinder.

10. Also prior to installation the clevis that connects the master cylinder pushrod to the brake pedal arm must be installed. Later, all the adjustment procedures for optimizing the pushrod's length will be followed.

10.

Beyond the performance benefits, a hydro boost system also eliminates the need for a bulky power booster behind the brake master cylinder. Consequently, there's more clearance under the hood of many vehicles to accommodate the valve covers or exhaust manifolds/headers of big-block and LS swaps. The hydro booster used in this project, for example, was no wider than the Wilwood-supplied master cylinder.

Speaking of the project, it was the low-vacuum production of a lopey camshaft in the 383 small-block of a 1972 Chevelle that prompted the change to a hydro boost system. It coincided with an upgrade to a Wilwood-based, four-wheel disc brake setup, all of which were installed at Detroit-area Stellar Rod and Custom. The hydro boost kit cost about $510 but another $350 or so in a separate hose-and-fitting kit was also required.

With a typical Saginaw-style power steering system featuring a three-hose setup, the hydro boost takes a high-pressure feed from the power steering pump to the brake booster to provide the power assist and routes it back with another high-pressure line to the steering box for the power steering assistance. That's two of the hoses. The third is a low-pressure return to the pump.

Installation isn't particularly difficult from a wrench-turning perspective, but it involves bending several new hard lines for the brake system as well as adding a couple new

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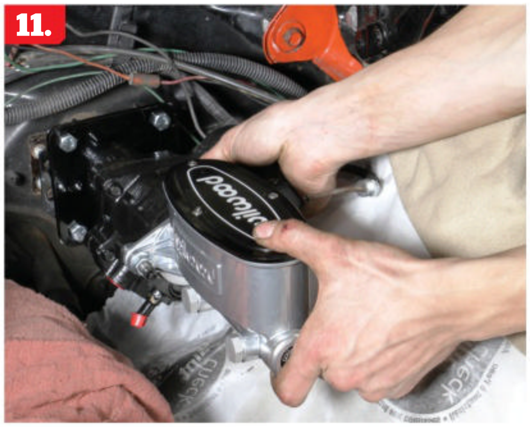

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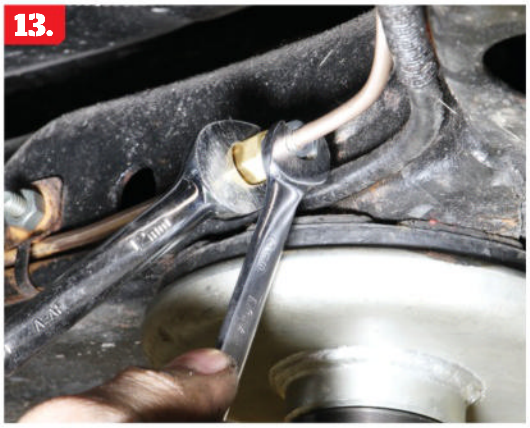


15.

11. Next, the booster/master cylinder assembly is slipped in place and bolted up in the same mounting position as the original booster. The new booster is obviously slimmer, but it's also notably longer than the vacuum booster, pushing the master cylinder farther away from the firewall. That will affect the routing of the brake lines.

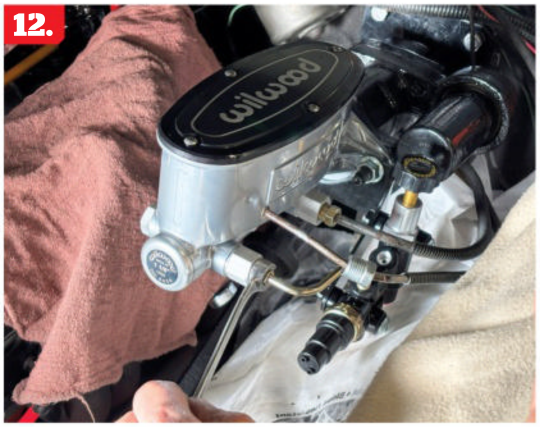
12. Another upgrade for this system is the addition of a brake proportioning valve, which limits pressure to the rear brakes to prevent lockup. It installs on a bracket sandwiched between the master cylinder and booster, with lines routed from the valve's distribution block to the master cylinder.

13. The original brake lines no longer fit with the new booster, master cylinder, and proportioning valve installed. For vehicles with older or even original brake lines, it's a good opportunity for replacements. On this vehicle, new lines had already been run for the Wilwood disc brakes, so a junction was spliced into the new rear brake line and linked to the master cylinder/proportioning valve.

14 At the proportion valve's distribution block, the lines for the rear brakes and separate left- and right-front brakes are shown bent, routed, and installed. The lines are coiled to provide a measure of flex, which is helpful in a body-on-frame vehicle with rubber body mounts that flex themselves.

15. Work now moves to the power steering side of the project, with the reservoir drained and the lines disconnected. With Saginaw-type three-hose systems, the conversion takes a high-pressure line from the pump to feed the booster, while a second high-pressure line runs from the booster to the steering box. There's also a low-pressure return line from the booster to the steering pump.

16. New, longer hydraulic lines must be created to replace the originals. Dummy lines were run to gauge the proper length, while the new GM-style inverted flare fittings were installed to determine the proper clocking positions for them. The hoses and fittings were part of a separate kit and it included a T-fitting that's required to splice the low-pressure return line into the return from the steering box to the pump.

12.


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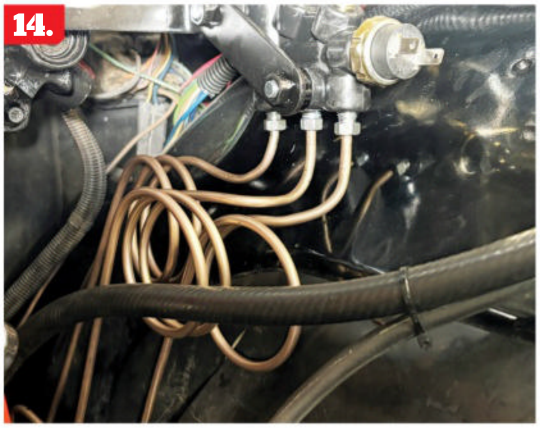


16.

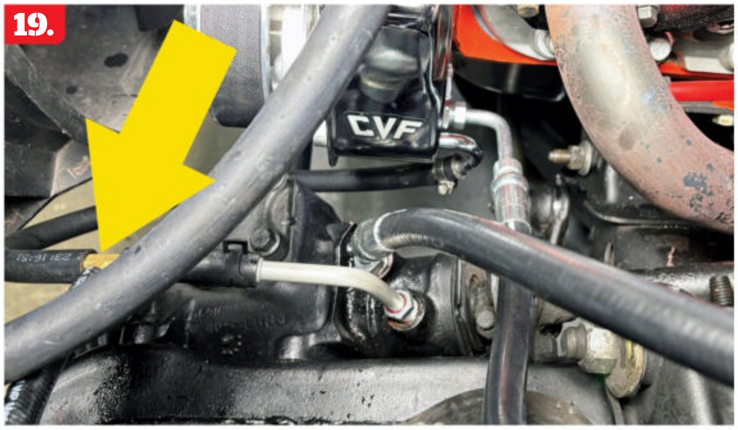
17. The lines made on the fittings and hoses with a marker provided an installation guide for the new lines.

18. After a quick trip to the nearby tire-and-rubber shop where the fittings were crimped onto the hoses, the new hydraulic lines were installed.

17.

18.

19.



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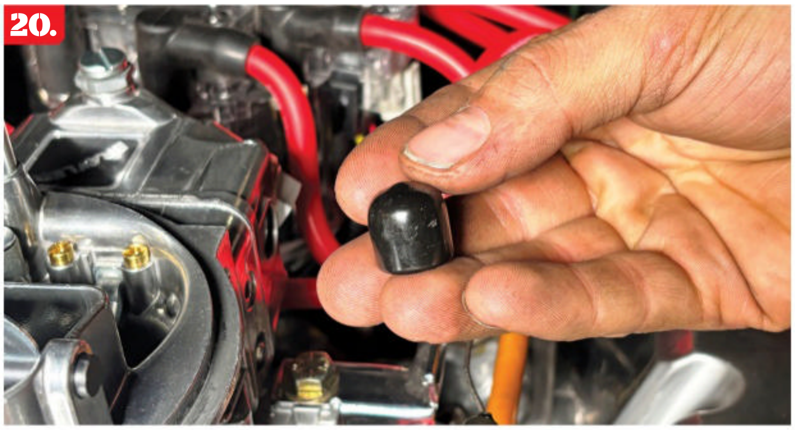


hydraulic hoses. For this project, the shop had the requisite hard line benders but had to send out to get the supplied hydraulic hose fittings properly crimped. We suspect most home enthusiasts would be in the same boat. Fortunately, many tire/rubber shops can do the job while you wait.

It's also important to remember there are two pushrods in this system and neither one of them is on the master cylinder. One pushrod that attaches the hydro boost to the brake pedal inside the car and a pushrod on the engine side of the hydro boost that engages the master cylinder. When you press on the brake pedal (hydro boost or vacuum booster) you are pressing on the power unit. As the power unit gets that force it applies the given force outlet to the master cylinder. That pushrod on the hydro boost/vacuum booster to the master cylinder needs to be adjusted unless it was from the company you purchased the whole unit from. If the hydro boost/vacuum booster was purchased from one company and the master cylinder from another, that pushrod adjustment is very important—more so than the hydro boost to pedal adjustment.

In the end, the Chevelle's all-new braking system feels remarkably more responsive. In addition to the capability of the Wilwood four-wheel discs, the hydraulic power of the hydro boost system adds an assuring degree of confidence when the foot hits the pedal. It's high-performance braking for a high-performance muscle car. ACP

21.

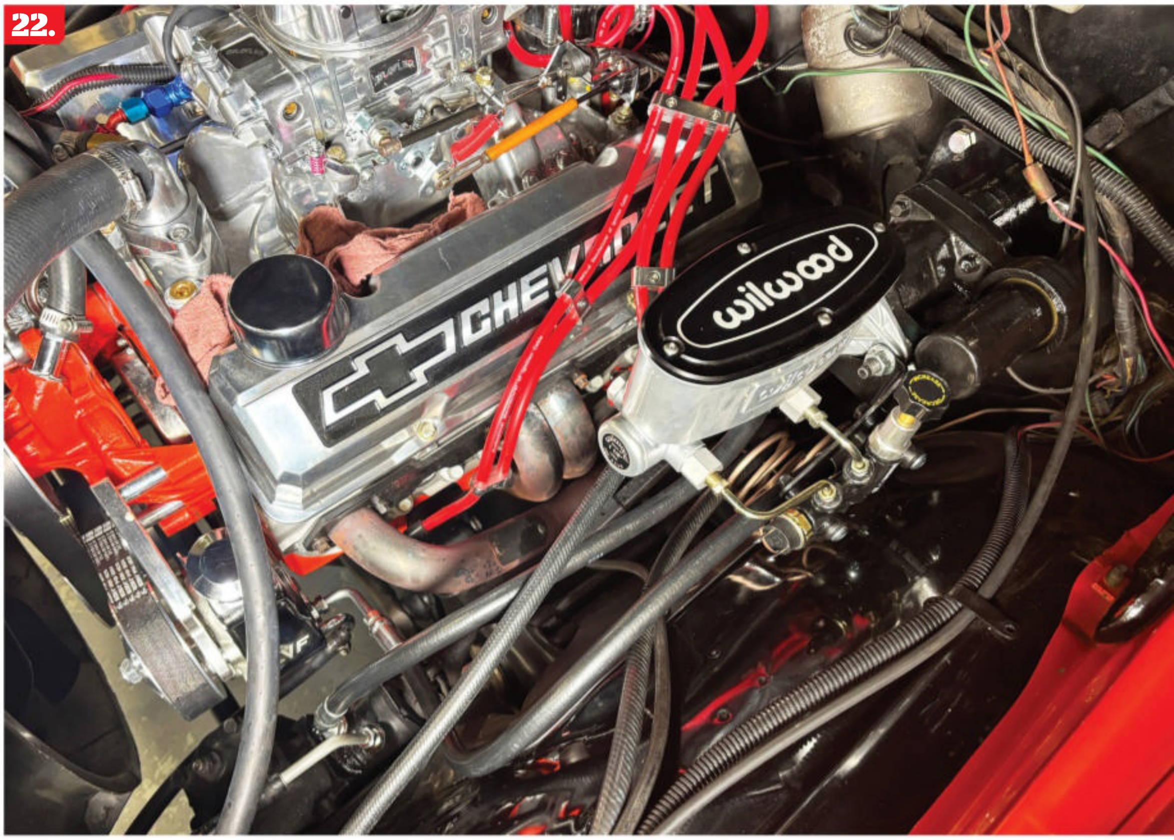
19. In this shot, all the new lines have been installed. At the pump, the feed line routes to the booster, while the second high-pressure line is seen routed into the steering box. At the left is the T-junction *(arrow)* that takes the return lines from the booster and steering box and flows back into the pump.

20. Of course, the vacuum port in the intake manifold for the original brake booster cannot be left open, so a cap is inserted on it at the rear of the intake manifold.

21. The rest of the project includes the basics of bleeding the brake system and ensuring the brake pedal is adjusted properly with the new master cylinder pushrod.

22. Finally, the hydro boost system also needs to be bled. It's the same process as bleeding the power steering system: After the fluid is added to the pump, the steering wheel is turned from lock to lock to purge air from the system. After that, its job is done!

22.



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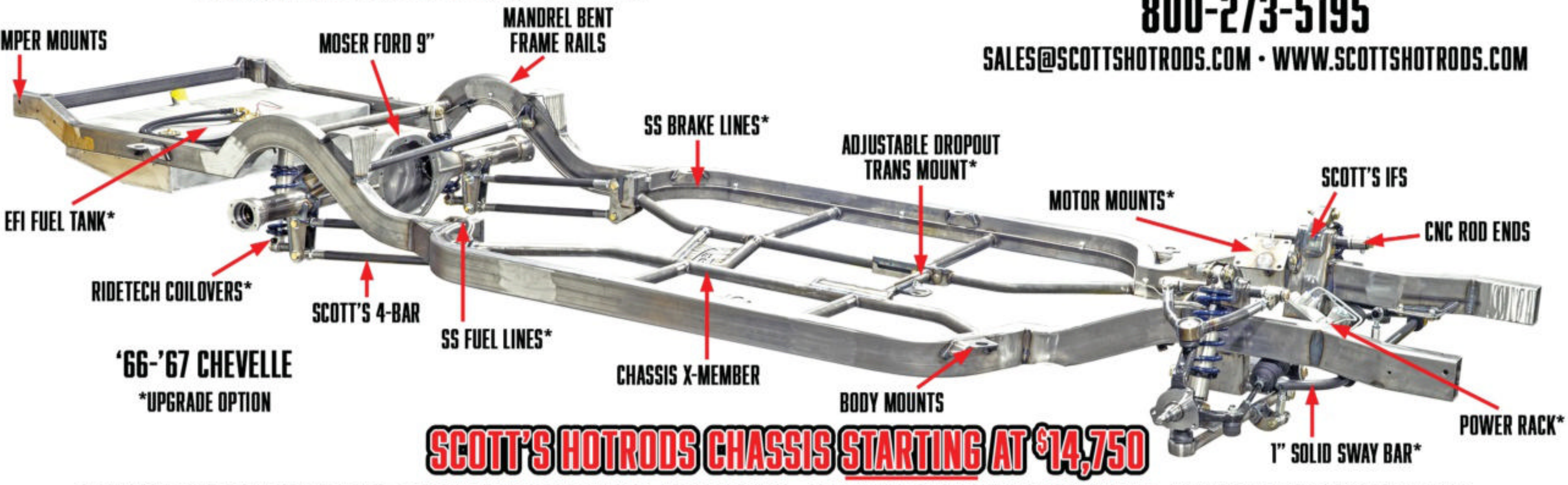
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BY **GRANT COX** & **NICK LICATA** IMAGES BY **GRANT COX**

UNCOMMON

At just 17 years old, Michael Housh was already juggling a busy life filled with school, sports, and family. Growing up as one of four siblings, all two years apart, taught him the value of hard work and family sacrifices. Little did he know that one fateful football game would spark a story that spanned decades, centering around a golden bronze 1972 Monte Carlo.

After a standout performance on the football field, Michael's dad pulled him aside for a post-game chat. He praised his son for his hard work both in school and on the field, then came the surprise of a lifetime: a trip to Kansas City to pick out a car.

RESTOMOD

MICHAEL HOUSH'S **1972** MONTE CARLO

Michael was stunned. Knowing the financial pressures of raising four children, he hesitated, downplaying his father's offer and letting him know it wasn't necessary. What he thought was humility ended up hurting his dad's feelings. The two didn't speak for weeks but time and mutual apologies healed the rift.

Finally, they went car shopping, and that's when Michael saw it: a 1972 Monte Carlo. With its 350ci engine, gleaming golden bronze paint, and chrome spoked wheels, the car practically called out to him. It was a dream come true.

Like any teenager with a passion for cars, Michael quickly personalized his Monte with an aftermarket stereo system. But about a year later, the engine began to burn oil excessively. Once again, his dad stepped in, purchasing a 1974 Nova with a 350 that had only 34,000 original miles on it. The summer they swapped out the engines was one Michael would never forget.

Together, father and son dismantled and repainted parts of the car, transforming the project into a hands-on education in mechanics and building something together with his dad. The lessons he learned under the hood shaped his understanding of engines and deepened his appreciation for his father's sacrifices even more.

The Monte wasn't just a high school ride—it became a constant companion through college, early marriage, and adulthood. But as life demands grew so did the price of fuel, so Michael reluctantly tried to sell the car, but after six months with no buyers, his dad stepped in once again and purchased the car for Michael's younger brother, who also drove it through his own high school and college years.

After that the car was no longer in regular use, but Michael's dad refused to sell it, so the car spent years tucked away—first at his dad's and then in a barn. It wasn't until 2019, nearly five decades after the car was first purchased, that Michael decided it was time to bring it back to life. With the support of his wife and son, the car was hauled out of storage and headed for fresh professional restoration.

Starting under the hood, Tom Betlock built a powerful 454ci big-block with a forged rotating assembly, AFR heads, and Edelbrock intake with

dual carbs. Betlock dressed it in aluminum Chevrolet valve covers and bolted on a March serpentine drive system up front to liven things up. A Be Cool radiator and dual Spal electric fans keep the engine cool while Doug's headers expel spent fuel through a 3-inch exhaust and Flowmaster mufflers. It's all good for about 475 hp.

A TCI 700-R4 transmission sends power to a GM 12-bolt rearend stuffed with 3.73 gears and an Eaton Truetrac posi unit along with 31-spline axles. It's a resilient system that's plenty capable of holding up to the demands of Michael's heavy right foot.

The suspension was upgraded with Detroit Speed coilover shocks all around while Hotchkis rear control arms and rear sway bar keep the big Monte on the level. A Hotchkis front sway bar echoes the rear and confirms body roll stays in check. A Classic Performance Products quick-ratio steering box maintains precise steering in performance driving situations.

Billet Specialties wheels, come in at 18x8 up front and 19x10 out back, are wrapped in Michelin Pilot Sport rubber.

Inside is a completely redesigned interior with new custom leather, featuring custom seats, door panels, headliner, center console, dashpad, and carpeting—expertly crafted by Oz Custom Upholstery in Columbus, Kansas. For a classic touch, a RetroSound head unit maintains the vintage look while creating a modern high-end sound. The Audio Dynamics speakers are strategically placed throughout and the amps, subwoofer, and a DSP are seamlessly hidden by custom enclosed panels in the trunk. The new dash is outfitted with Dakota Digital RTX gauges, an adjustable Dakota Digital fan controller and gearshift module. A Vintage Air climate-control system maintains a comfy captain's quarters, and a Billet Specialties steering wheel, perfectly matched to the wheels, is paired with billet pedals, shift lever, and door handles.

Nick Koehn of Nick's MuscleCar Station handled the bodywork, design, and paint, delivering a sleek and modernized look. The front and rear bumpers were shaved, then bodyworked and finished in a flat paint for a unified appearance. A one-off custom grille features three bars with a custom mesh backing. The hideaway headlights operate via DSE motors revealing LED headlights when turned on.

The engine compartment shows a fully custom design, including a shaved firewall with a hidden bracket system for A/C and heat. Custom sheetmetal inner fenders smoothly integrate the header panel that conceals the radiator, condenser, fans, and headlight mechanisms. All panels are bead-rolled and then painted in a flat body color with stainless bolts tying everything together. The hood is secured with hinges from Eddie Motorsports.

For improved clearance, the front fender lips were trimmed while all emblems and fender trim were removed and smoothed. The windshield and rear glass are flush-mounted OEM replacements to eliminate exterior trim pieces, and the driprails were removed for a cleaner profile. The trim around the side windows, as well as the billet side mirrors by Ringbrothers, are painted in a matching flat body color. The taillights are custom LED units with a unique design, while the rear tailpanel has been smoothed, with bezels painted to complement the body color.

The exterior is finished in a custom-mixed House of Kolor Maroon, topped with eight coats of clearcoat and polished to a mile-deep gloss.

Looking back, Michael says that he would have opted for a custom chassis if given the chance, but even with the factory frame, the Monte came out better than he expected. It was a labor of love that also served as a reminder of his dad's unwavering support, his belief in Michael's dreams, and the simple joy of taking a ride together in a car that was brought back to life through passion and persistence. And what a ride it's been. ACP

TECH ✓

OWNER: Michael and Cammie Housh, Eldorado Springs, Missouri
VEHICLE: 1972 Chevy Monte Carlo

Engine

TYPE: Big-block
DISPLACEMENT: 468 ci
BUILDER: Tom Betlock
ROTATING ASSEMBLY: All forged
CYLINDER HEADS: AFR
INDUCTION: Edelbrock intake
CARBURETORS: Edelbrock
EXHAUST: Doug's headers, Flowmaster 3-inch exhaust, Flowmaster mufflers
VALVE COVERS: Chevrolet Performance
ACCESSORY DRIVE SYSTEM: March
ANCILLARIES: Be Cool radiator, dual Spal fans
OUTPUT: 475 hp, 500 lb-ft of torque

Drivetrain

TRANSMISSION: TCI 700-R4
REAR AXLE: GM 12-bolt, 3.73 gears, Truetrac posi, 31-spline axles

Chassis

FRONT SUSPENSION: Detroit Speed coilover shocks, Hotchkis sway bar
REAR SUSPENSION: Detroit Speed coilover shocks, Hotchkis control arms, Hotchkis sway bar
STEERING: Classic Performance Products steering box
BRAKES: Classic Performance Products disc front and rear

Wheels & Tires

WHEELS: Billet Specialties 18x8 front, 18x10 rear
TIRES: Michelin Pilot Sport 235/50R18 front, 295/40R19 rear

Interior

UPHOLSTERY: Leather
INSTALLATION: Oz Custom Upholstery (Columbus, KS)
DOOR PANELS: Custom
SEATS: Modified Snowden frames
STEERING: Billet Specialties steering wheel
DASH: Custom
INSTRUMENTATION: Dakota Digital
WIRING: Painless Performance
HVAC: Vintage Air
AUDIO SYSTEM: RetroSound head unit, Audio Dynamics speakers, trunk-mounted sub

Exterior

BODYWORK AND PAINT: Nick Koehn, Nick's Muscle Car Station (Ford Scott, KS)
PAINT: House of Kolor Maroon
GRILLE: Custom
FRONT AND REAR BUMPERS: Stock, smoothed and tucked
HEADLIGHTS: LED Hideaway with Detroit Speed electric doors
TAILLIGHTS: Custom LED
SIDE MIRRORS: Ringbrothers
GLASS: Flushmount
DOOR HANDLES: Kindig It
METALWORK MODIFICATIONS: Custom bead-rolled inner fenders and radiator cover, engine bay smoothed, fender lips trimmed, shaved emblems, shaved dripails

BY **RYAN MANSON** ◣ IMAGES BY **THE AUTHOR**

HUNTING DOWN CREATURE COMFORTS IN A HANDYMAN WAGON

Last month, we concluded the installation of a Gen 5 Vintage Air SureFit kit in our 1957 Chevy Handyman Wagon by installing the evaporator unit. The defroster vents were installed and hoses attached, as was the center vent, and hoses were routed in preparation for the side vents. The drain was in place to route any condensation outside the vehicle and the four hard lines were installed and routed through the firewall. It would seem that we were on the downhill slope, and for all intents and purposes, we were, but there's still a lot of work to be done.

PART 2:

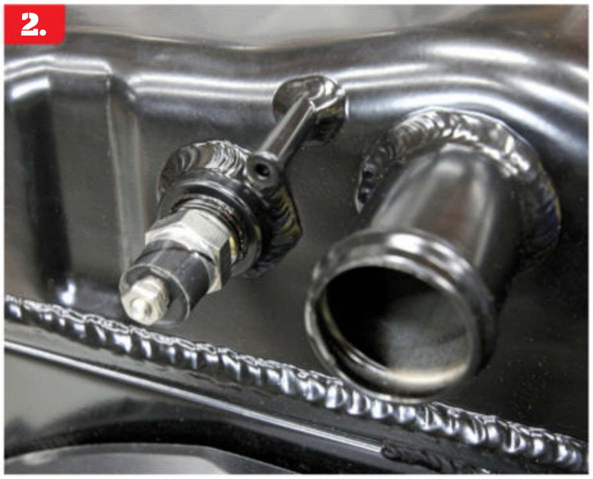
WRAPPING UP THE INSTALLATION OF VINTAGE AIR'S GEN 5 SUREFIT KIT IN A 1957 CHEVY

1.

1. A/C condensers can generate a fair amount of heat, and that only adds to the heat generated by the engine. Thus, it's important to have a cooling system that operates as efficiently as possible. For that end, we turned to DeWitts and ordered one of their LS Swap Aluminum Radiators finished in black (PN 32-6239013M). The serpentine fins and brazed construction, with factory-type press-formed upper and lower tanks, provide not only a factory look but an increase in cooling performance. When ordered in conjunction with their electric fan kit, the DeWitts radiator setup ensures that not only will the temps of our LS3 engine be sufficiently controlled, but our A/C system will be operating at peak efficiency.

2. One of the features of the Dewitts LS Swap Aluminum Radiator is the inclusion of a steam line vent tube and coolant temp sensor bung in the top tank.

2.



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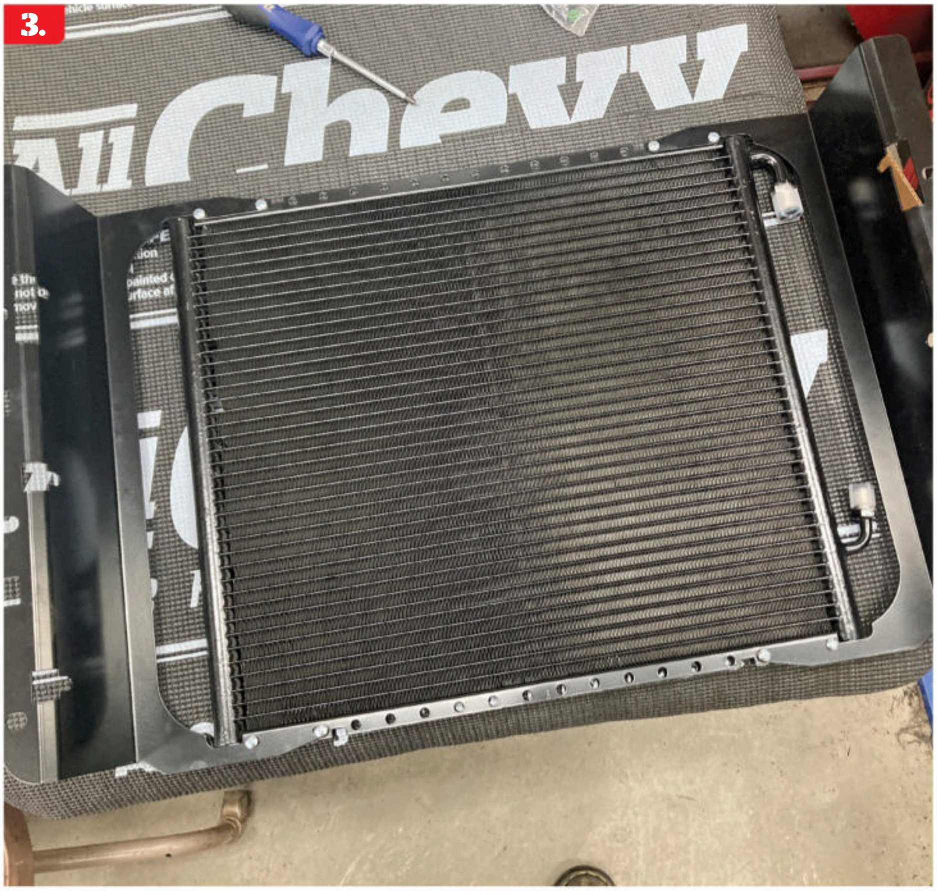
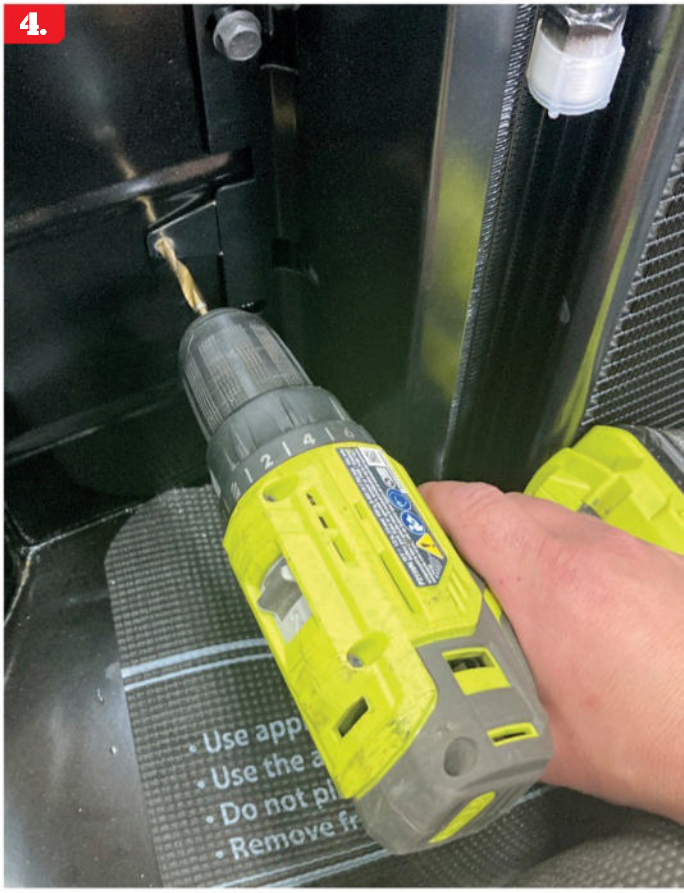


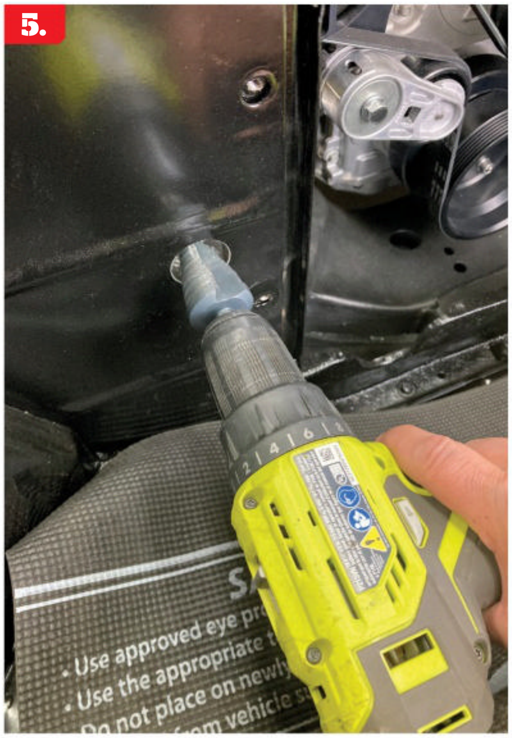
3. Here's the assembled Vintage Air A/C condenser and bracket assembly ready to install. Note the larger #8 line is at the top of the passenger side.

4.



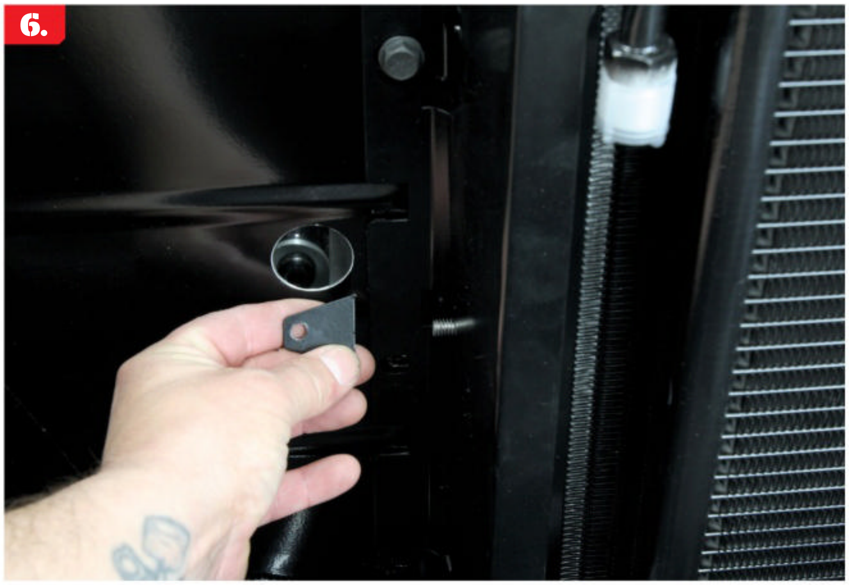
4. The triangular break-off tab on the passenger side of the condenser assembly serves as a locator for the hole that will be used as a pass-through for the A/C hard lines. With the condenser assembly temporarily installed, using the tab as a guide, a ¼-inch pilot hole is drilled.

5.



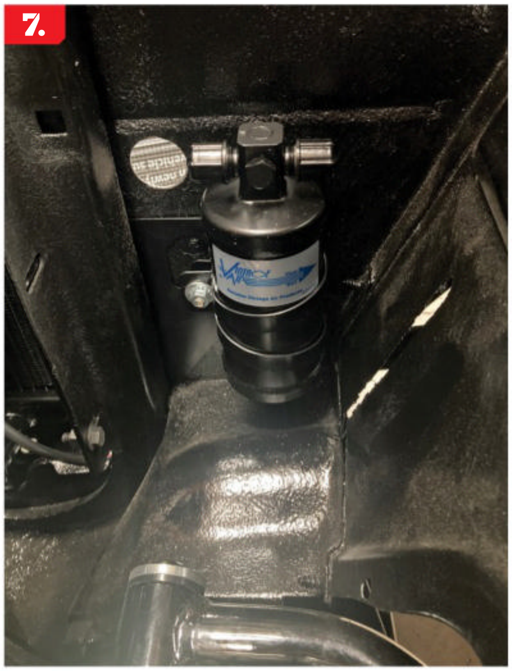
5. The condenser assembly is then removed so that the hole can be enlarged to 1¼ inch.

6.



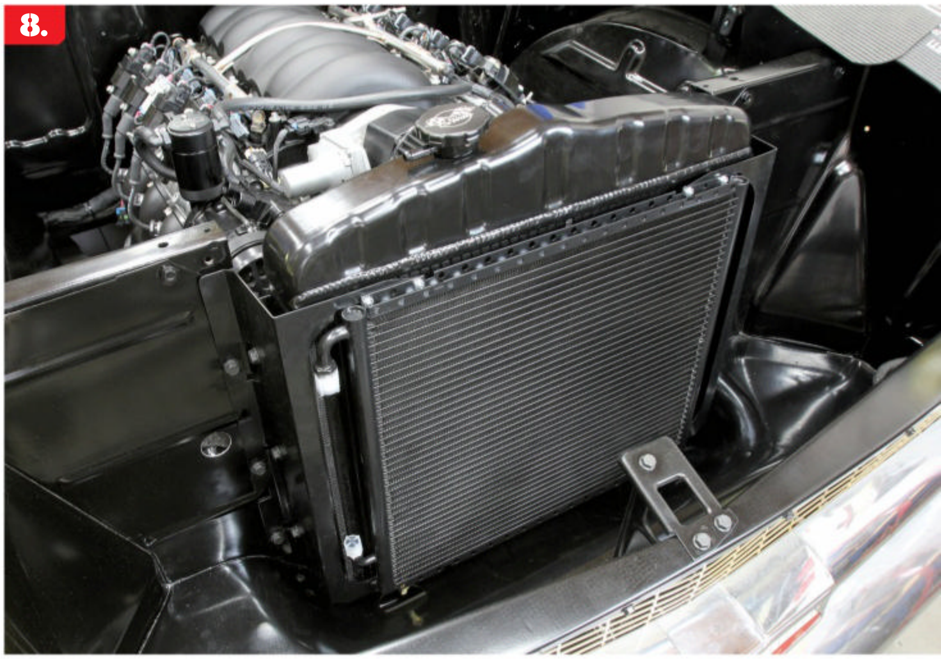
6. The break-off tab is then removed and the condenser assembly reinstalled.

7.



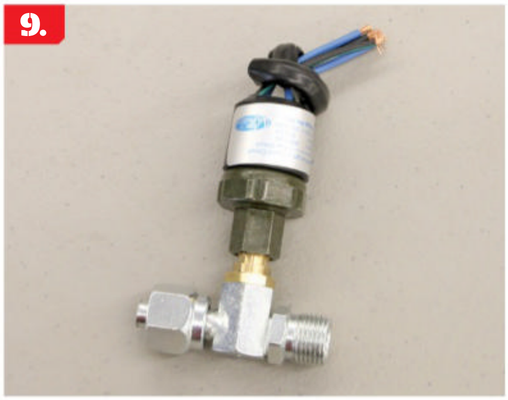
7. On the opposite side of the core support, the drier assembly has been installed using the bracket provided by Vintage Air.

8.



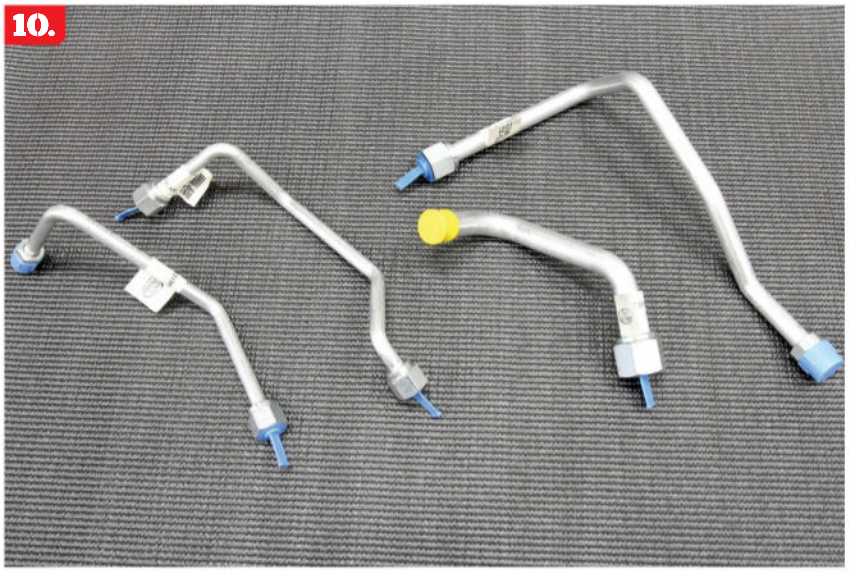
8. Here's the radiator and condenser assembly installed and ready to be plumbed. Note we installed the radiator in front of the core support, a necessity due to the front pulley system and electric fan arrangement.

9.



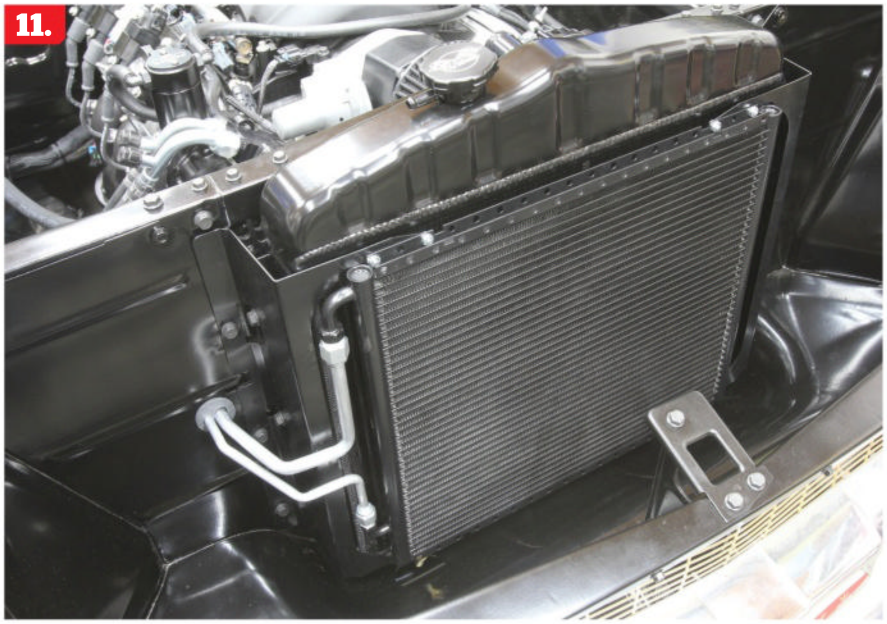
9. Since we want the electric fan to be triggered by A/C pressure as well as engine temperature, we will be using a trinary safety switch. These can be installed directly into the side port on the drier or inline using the parts pictured.

10.



10. Accurately bending hard lines can be challenging for even the most advanced builders. Thankfully, Vintage Air provides pre-bent hard lines where required; two at the evaporator (previously installed) and two at the condenser.

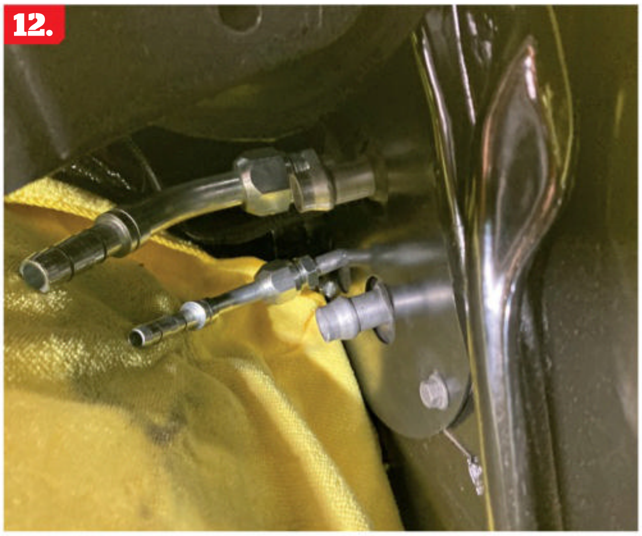
11.



11. In this case, the #8 condenser/compressor hard line and the #6 condenser/drier hard lines have been installed and pass through the core support. The condenser/drier hard line will connect directly to the drier, while the condenser/compressor hard line will connect to a hose that will route to the #8 connection on the compressor.

12. The other side of the drier will connect to a hose that will terminate at the #6 hard line poking through the firewall from the evaporator. This is referred to as the high side of the system. The other side of the compressor will also terminate at the evap unit (top fitting). This is the largest of the three hoses (#10) and often referred to as the low side.

12.



13.

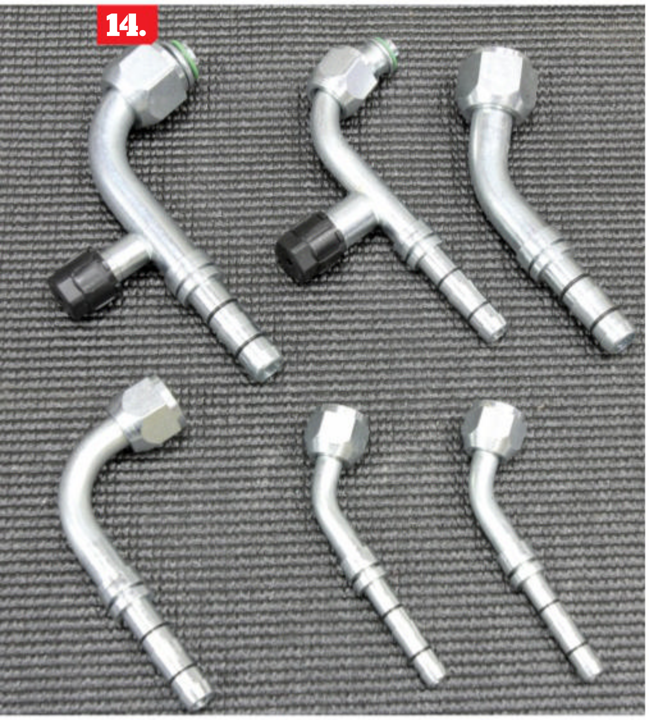
13. Generally speaking, there are two common hose types that are used in automotive A/C systems: crimp-type Beadlock and E-Z Clip. We prefer the E-Z Clip style due to the smaller hose diameter, increased flexibility, and simplicity of installation. Pictured here are the #6, #8, and #10 hoses that we'll be using. Note that the hoses between the two styles are not interchangeable and require their own respective fittings be used.

14. E-Z Clip fittings are available in a variety of radius bends with and without charge ports.

15. The business end of an E-Z Clip hose consists of the hose fitting, cage, and two clips.

16. After the length of the hose is determined, a nice, square cut is made ...

14.



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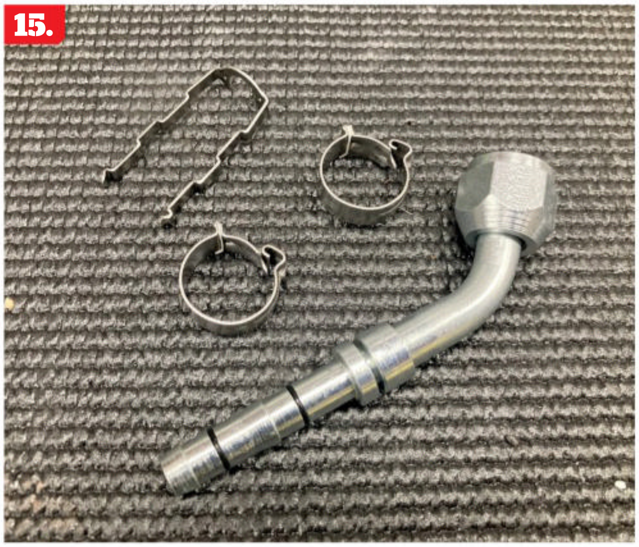


For starters, we still need to install the radiator and condenser unit. The previous small-block that was in our 1957 had a meager mechanical fan that pulled just enough air to keep the mild motor happy. With the installation of a hot-rodded LS3, this obviously wasn't going to do, so we turned to DeWitts to help us sort out our cooling requirements. Since the addition of the A/C and its requisite condenser will add some additional heat load to the overall system, it's paramount that the cooling system be at peak performance to ensure the A/C system blows air as cool as the Arctic snow. DeWitts' recommendation of their LS Swap Aluminum Radiator with included electric fan filled the required void with room to spare

17.

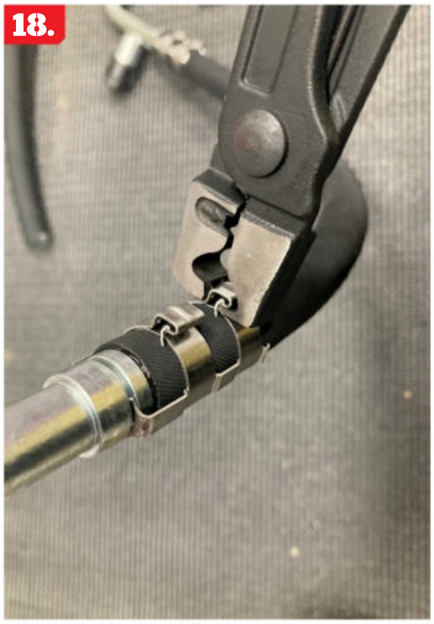
17... before the hose is slid onto the fitting. I like to apply a touch of O-ring oil on the fitting to ensure the hose goes on easily and doesn't damage the O-rings on the fitting.

18. Next, a cage and two clips are installed and crimped in place using a specialized E-Z Clip tool.

19. With that, we have a finished hose end without the expense of specialized crimp tooling.

20. That same O-ring oil is always used on every O-ring fitting in the system to prevent damage due to dry O-ring installation.

18.



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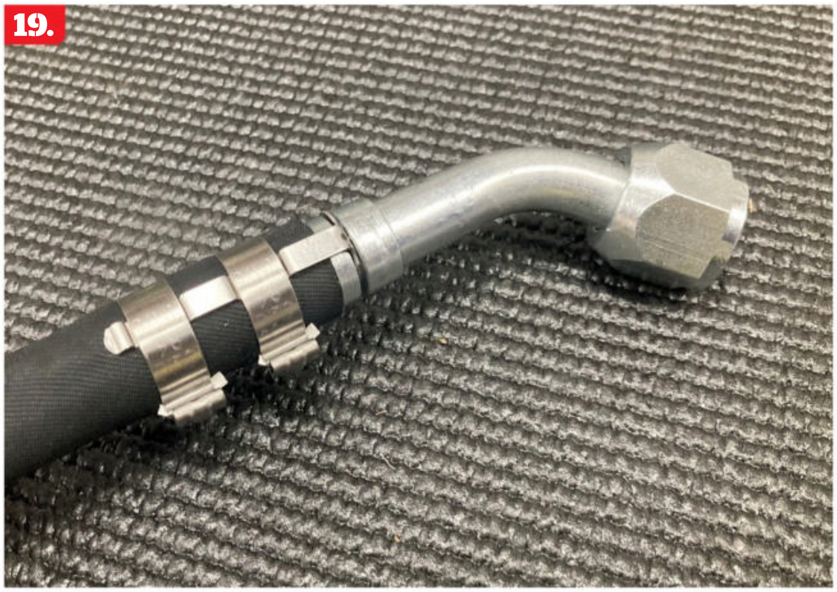

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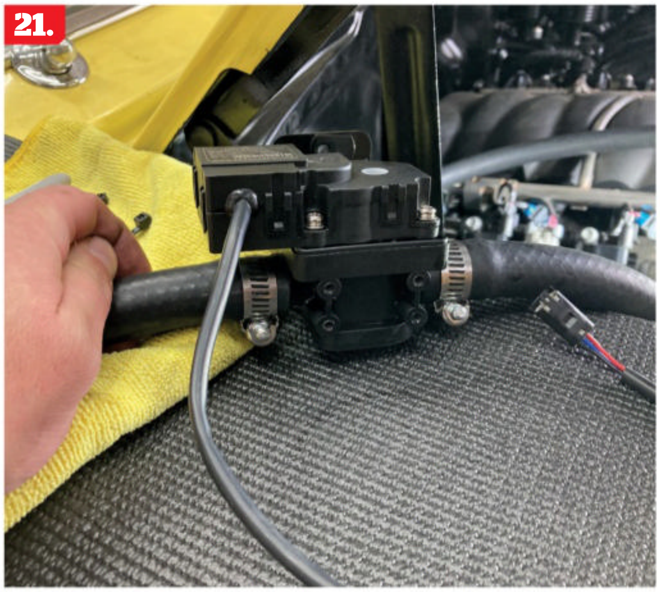
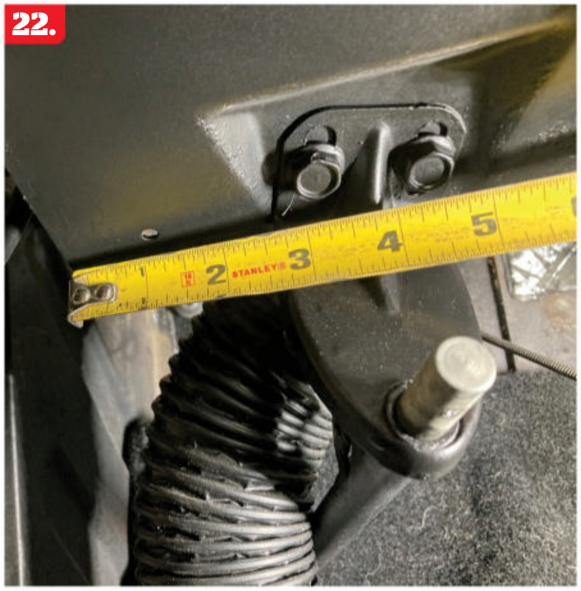


21. Heater hose installation is standard procedure, with the addition of a heater control valve that must be installed in the high-pressure (usually an intake manifold port) side of the system with the molded coolant flow arrow pointed to the heater coil. Note the orientation of the heater valve, with the electronic portion of the valve above the water line. This is to prevent failure of the electronics if a leak is developed.

22. Turning our attention inside the wagon, it's time to mount our side louvers. A $^7/_{32}$-inch hole is drilled in the bottom of the dash rail, $^3/_8$-inch outside of the existing OE hole.

22.



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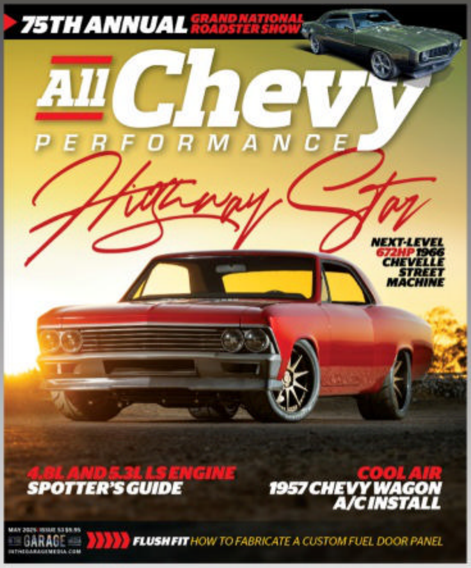
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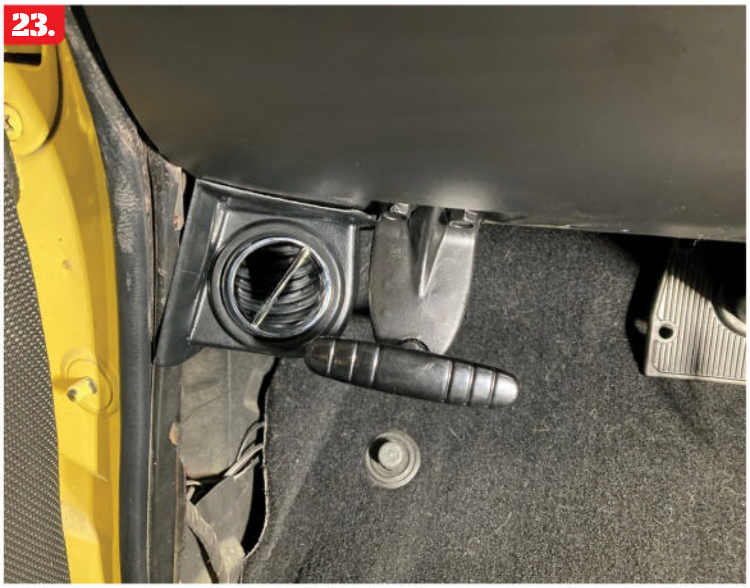

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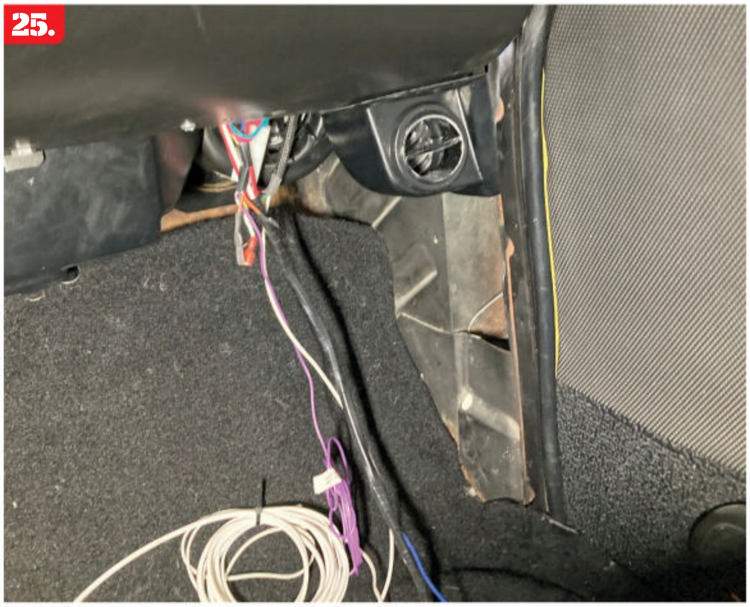


With that tackled, it's time to turn our attention to the various hoses required in the system. While the heater hoses are pretty standard fair, the A/C system's hoses are not. There are two types of hoses generally found in automotive A/C systems: Beadlock and E-Z Clip. Beadlock has been the industry standard for years but requires expensive tooling to provide the required crimp. E-Z Clip on the other hand can be assembled using a handheld, affordable crimper and a handful of components. The E-Z Clip hose is also slightly smaller in diameter and more flexible, making it easier to route through tight spaces.

Once the system was plumbed, our attention turned to the inside of the car where the wiring was buttoned up and the control panel modified to accept the electronic cable converter assemblies that will translate the position of each lever to the evap unit's ECU communicating the changes desired electronically, whether they be in the mode, temp, or blower speed realm. At this point, the two side louvers are installed using Vintage Air's provided brackets and components and the remaining ducting ran to each.

24.

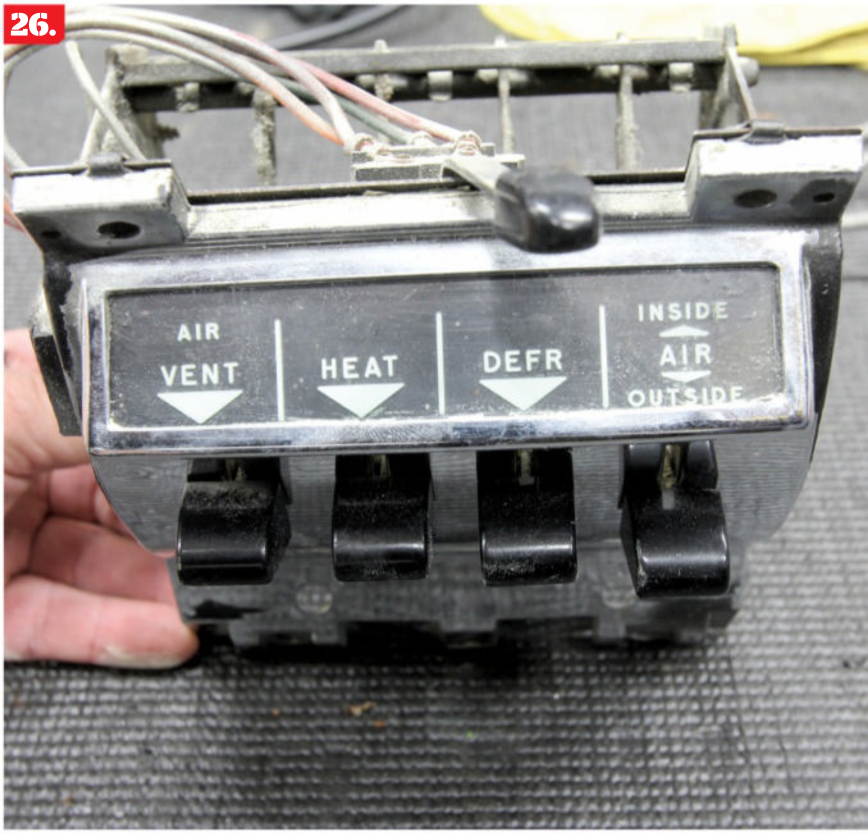
23. The louver assembly is then combined with the provided aluminum bracket and installed.

24. We installed the center louver assembly last time, but here it is again for reference.

25. The passenger side louver is installed in the same manner and thus completes our installation. But, while we're at it, we should cover the wiring side of the installation. A violet wire provides 12 V switched to power on the unit and should be connected as such. A small tan wire will be connected when a Vintage Air control panel is used to provide dash backlight power. A separate group of violet/yellow/white wires will pass through the firewall and connect to the heater control valve. Connecting to the trinary switch is a blue wire, the opposite side of which will be run to the compressor. Two white wires need to be attached directly to Batt-, while the orange and red wires will be connected directly to Batt+, with the corresponding fuses in line for protection.

26. A/C in the 1950s meant the coolest things we're going to get was the temperature of the ambient air outside the vehicle. At peak season in Phoenix, this isn't too comfortable of a situation. The stock heater control panel used cables to control the various functions. Using Vintage Air's Control Panel Conversion Kit (PN 472058), we'll be converting those mechanical functions with electronic ones. If you are looking for a more modern look on the dash, Vintage Air now offers a complete chrome-plated bolt-in replacement control panel.

26.



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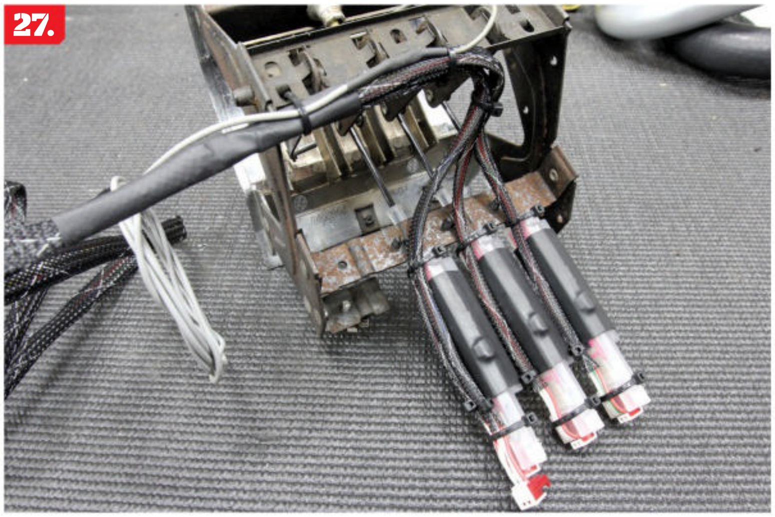

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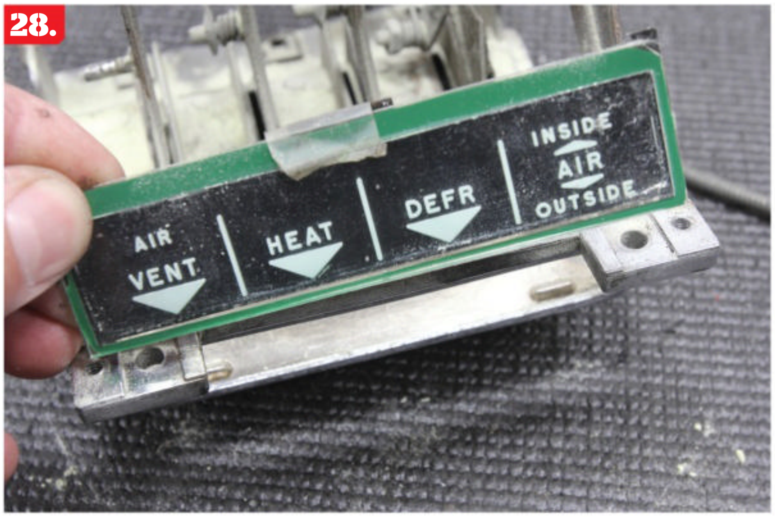
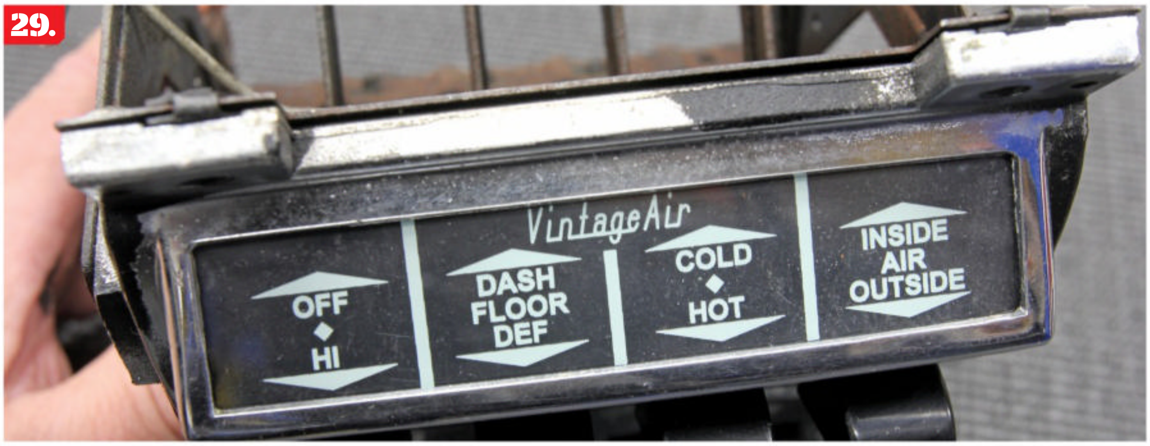

AIR
VENT
HEAT
DEFR
INSIDE
AIR
OUTSIDE

27. Three cable converter assemblies have been installed per Vintage Air's instructions. These will control the fan blower speed, mode, and temperature via the evap unit's ECU.

28-29. Since the controls have changed regarding which knob controls which function, Vintage Air provides an updated placard that is swapped out for the original.

30. With our A/C plumbed and wired, the last piece of the puzzle is to finish assembling the dash. Note the inconspicuous nature of the retrofitted control panel, clearly marked for function without damaging the original aesthetic of the Tri-Five's dash.

29.


VintageAir
OFF
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DASH
FLOOR
DEF
COLD
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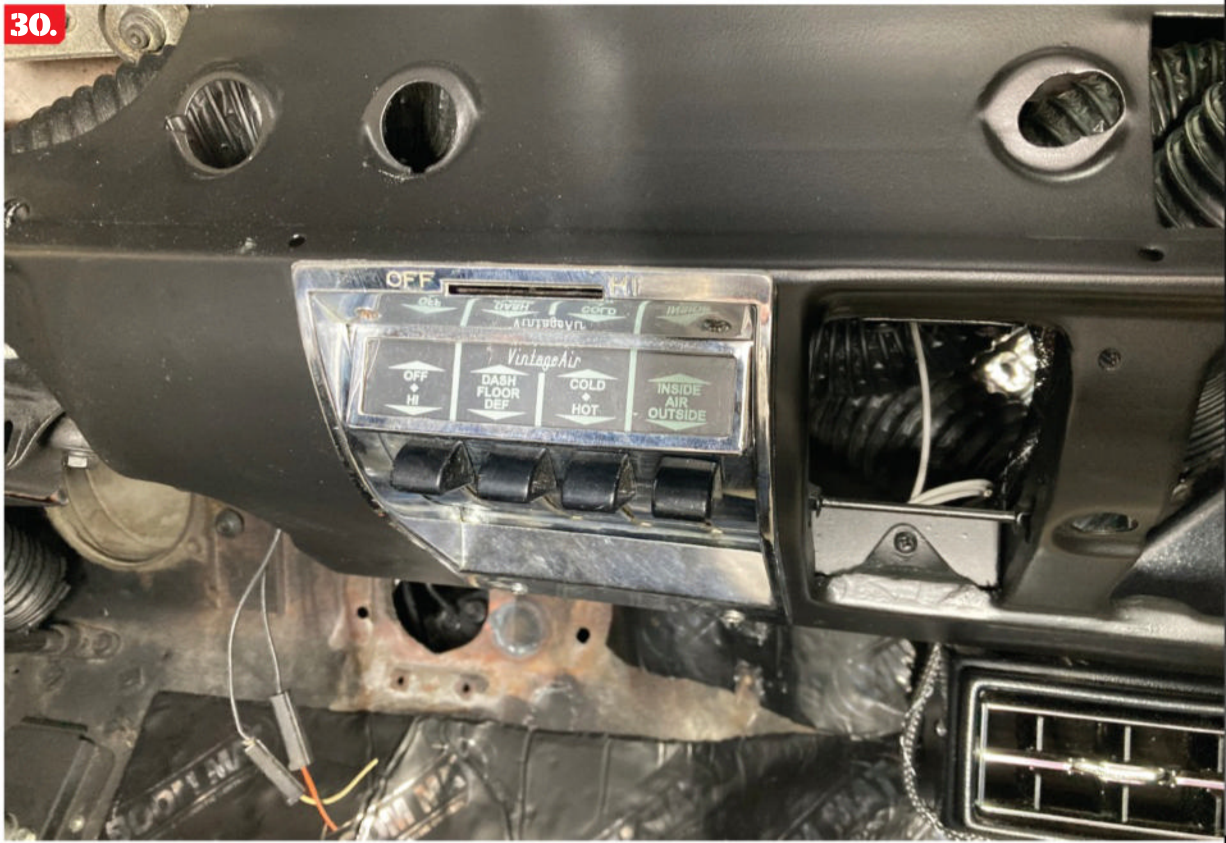
INSIDE
AIR
OUTSIDE

30.


OFF
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VintageAir
OFF
HI
DASH
FLOOR
DEF
COLD
HOT
INSIDE
AIR
OUTSIDE

Satisfied with our install, we made the short trek to our local automotive A/C shop where they charged the system with 1.8 pounds of R134a, no more, no less. After a run-through of the calibration sequence to ensure the ECU is receiving the proper signal from the control panel, we were happy campers, cruising cool with our newly climatized Chevy.

SOURCES

CLAMPDOWN COMPETITION
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FUEL
VOLTS
MPH
62
037415
P R N D 1
RPM/100
12:02
01480 MI
TEMP
OIL

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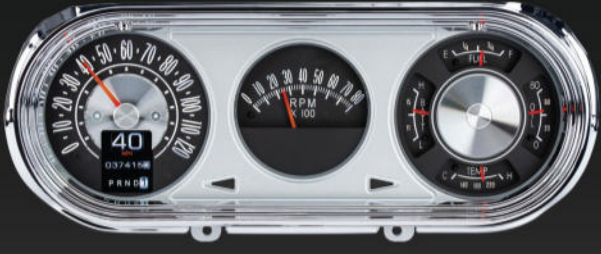
TEMP
FUEL
36
12:01

25
LIGHTS
IGNITION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X 100
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TEMP

38
037415
P R N D 1

GAS
BATT
TEMP
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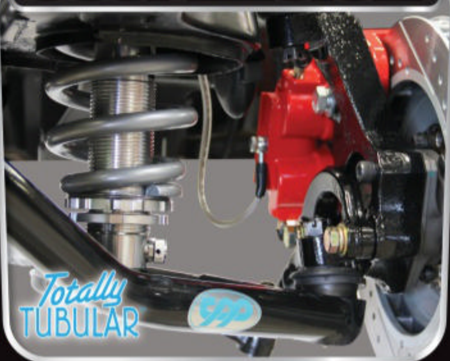

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